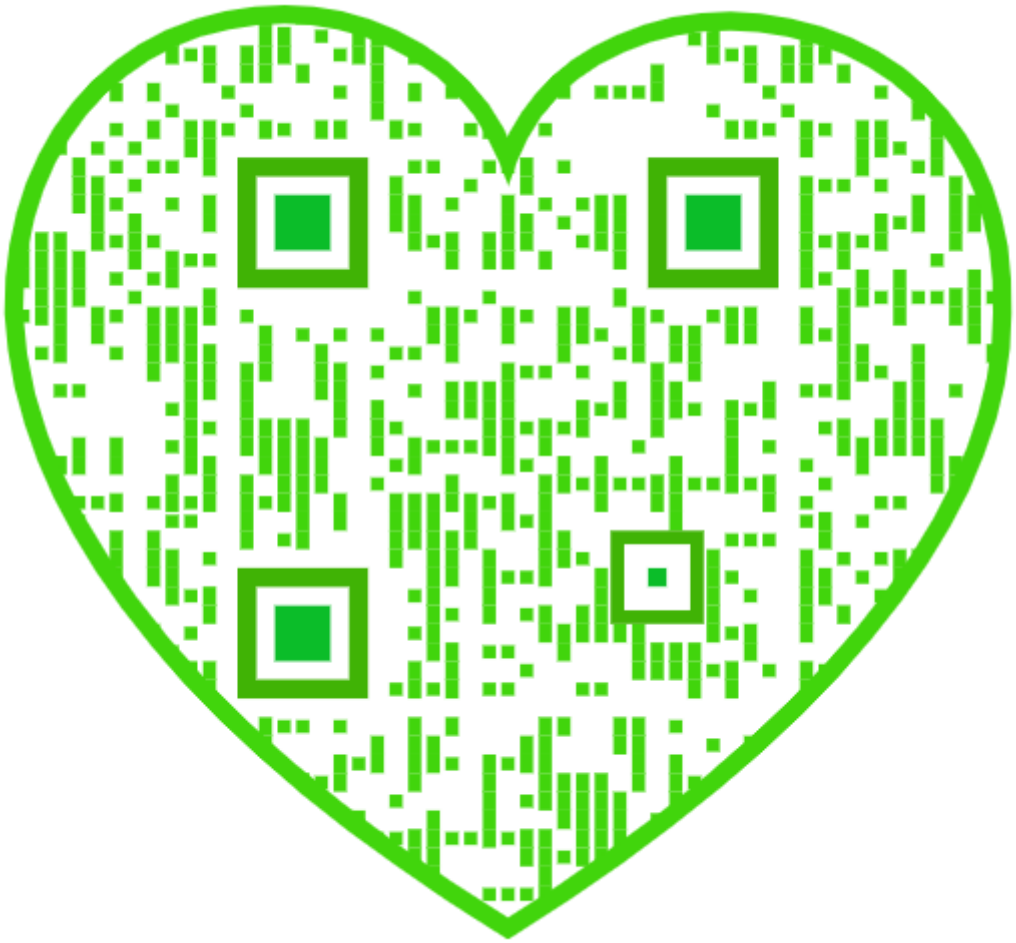
THE HORSE

ITS TREATMENT IN HEALTH & DISEASE



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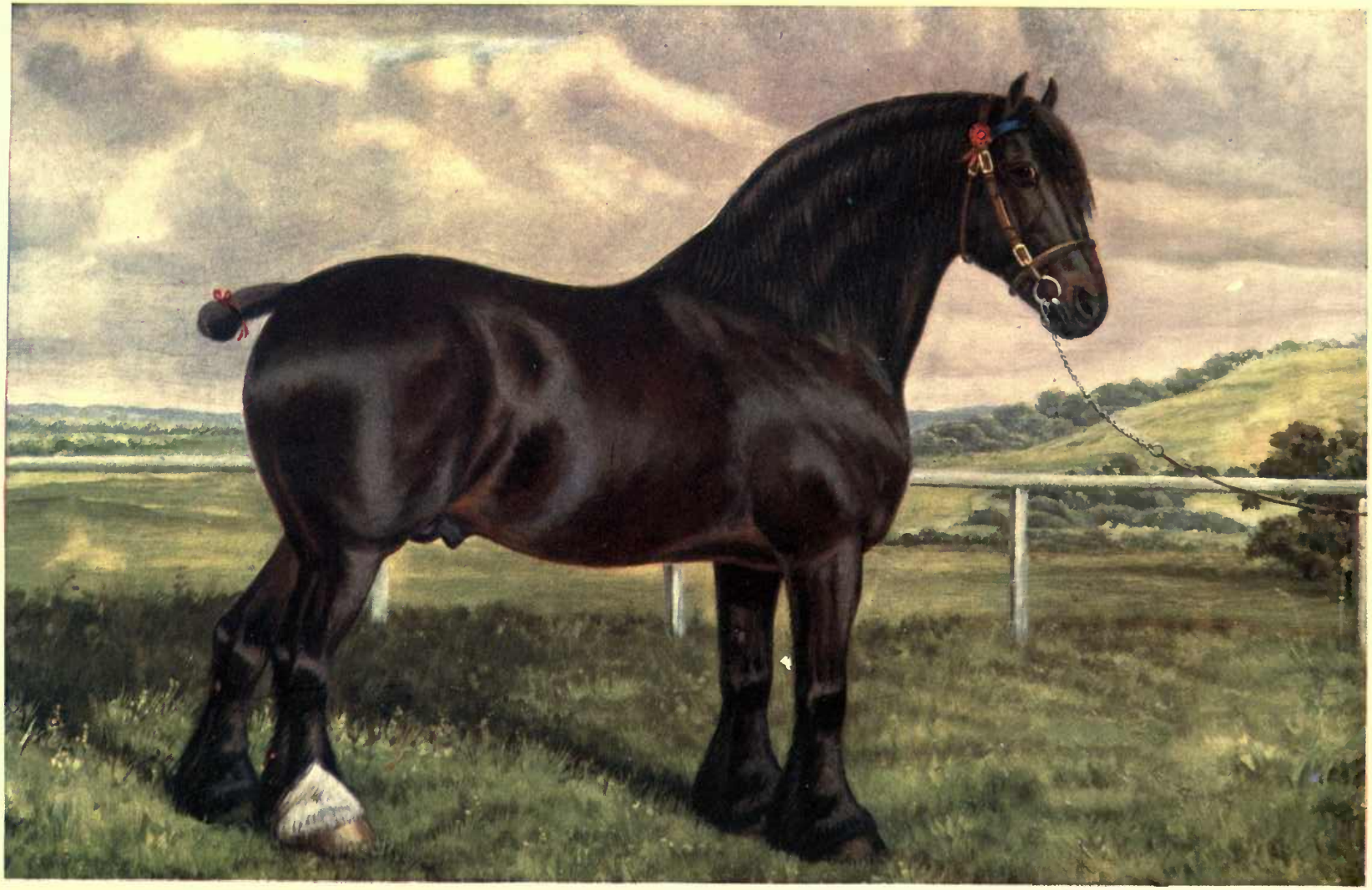
THE HORSE

ITS TREATMENT IN HEALTH AND DISEASE



CLYDESDALE STALLION, HOLYROOD

Owner, Marquis of Londonderry

THE HORSE

ITS TREATMENT IN HEALTH AND DISEASE

WITH A COMPLETE GUIDE TO BREEDING TRAINING AND MANAGEMENT

Edited by

PROF. J. WORTLEY AXE, M.R.C.V.S.

Ex-President of the Royal College of Veterinary Surgeons
Late Lecturer at the Royal Veterinary College, and at the Agricultural Colleges of Downton and Wye
Chief Veterinary Inspector to the Surrey County Council
Consulting Veterinary Surgeon to the British Dairy Farmers' Association

Author of "The Mare and Foal" "Abortion in Cattle" "Anthrax in Farm Stock"
"Examination of Horses as to Soundness" "Glanders, its Spread and Suppression" "Swine Fever"
"Lithotomy or the Removal of Stone from the Bladder of the Horse"

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Sterno-Maxillaris.—This is a long, narrow muscle situated in front of the neck, along the entire length of which it runs from the breast below to the lower jaw above. Its inferior portion is united with its fellow on the opposite side. About the middle of the neck they separate and pass upward and outward to their destination. The jugular vein runs on the outer border of this muscle.

Origin.—From the cariniform cartilage in front of the sternum.

Insertion.—By a short, flattened tendon into the angle of the lower jaw.

Action.—When acting with its fellow it draws the head downward. Acting alone, it pulls it to one side.

Sterno-Thyro-Hyoideus.—A long slender muscle, which becomes tendinous about the middle of the neck and then divides into two thin, narrow, muscular branches. It passes along in front of the trachea or windpipe.

Origin.—Joined with its fellow on the opposite side, it arises from the cariniform cartilage in front of the sternum.

Insertion.—By one division into the posterior border of the thyroid cartilage of the larynx, by the other into the body of the hyoid or tongue bone.

Action.—To depress the hyoid bone and larynx.

Subscapulo-Hyoideus.—A long, flat, narrow muscle, passing obliquely up the neck from beneath the scapula or blade-bone to the space between the branches of the lower jaw.

It separates the jugular vein from the carotid artery in the upper half of the neck.

Origin.—By a thin, flat tendon from the fascia on the under surface of the scapula.

Insertion.—Into the body of the hyoid bone (bone of the tongue).

Action.—To draw the hyoid bone downwards.

Rectus Capitis Anticus Major.—Situated at the side and front of the upper part of the neck, it extends from the fifth cervical vertebra to the base of the skull.

Origin.—From the transverse processes of the 3rd, 4th, and 5th bones of the neck.

Insertion.—Into the base of the skull at the junction of the basilar process of the occiput with the sphenoid bone.

Action.—To draw the head to one side, or to flex it, according as it acts by itself or with the corresponding muscle on the other side.

Rectus Capitis Anticus Minor.—A small, flat, fleshy muscle placed beneath the articulation of the head with the neck.

Origin.—From the under surface of the atlas.

Insertion.—Into the basilar process of the occipital bone and the body of the sphenoid bone.

Action.—Acting with its fellow on the opposite side, it flexes the head on the neck.

Rectus Capitis Lateralis.—A small, fleshy muscle placed beneath the atlas.

Origin.—From the body of the bone last named.

Insertion.—Into the styloid process of the occipital bone.

Action.—To assist in flexing the head on the neck.

Scalenus.—This muscle is situated in front of the first rib, and extends upwards as high as the fourth neck bone. It is composed of two unequal parts, the lower of which is the larger. Between them the axillary plexus of nerves passes on its way to the under part of the scapula, to be distributed to the fore extremity, and parts about the chest, breast, and shoulder. The axillary artery, in leaving the chest to be distributed to the fore-limb, winds round the anterior border of the first rib immediately beneath this muscle.

Origin.—From the transverse processes of the last four cervical vertebræ.

Insertion.—Into the anterior border and outer surface of the first rib.

Action.—By drawing the first rib forward, it assists inspiration. When the rib is fixed and the muscle contracts, the neck would be drawn downward and to one side.

Longus Colli.—The long muscle of the neck occupies the under surface of the bodies of all the cervical and the first six dorsal vertebræ.

Attachment.—To the bodies of the first six dorsal vertebræ. This portion proceeds forward, to be inserted by a strong tendon into the sixth cervical vertebra. That portion situated in front of the neck has its origin in the transverse processes of the last six cervical vertebræ, and in the bodies of the first six. Its terminal tendon gains attachment to the tubercle on the under surface of the atlas.

Action.—To bend the neck as a whole, or any part of it.

MUSCLES OF THE BACK AND LOINS

Trapezius.—Situated beneath the skin on the side of the neck and withers. It is a flat, triangular muscle, divided by a tendon into two portions, and sometimes described as two muscles—the cervical and dorsal trapezius.

Origin.—In front from the superior border of the ligamentum nuchæ, from which its fibres pass downwards and backwards. Behind from the

superior spines of the dorsal vertebræ from the 3rd to the 10th, whence its fibres pass downward and forward.

Insertion.—Into the tubercle on the outside of the spine of the scapula.

Action.—The cervical or neck portion acting alone would pull the shoulder upwards and forwards. The dorsal or back division acting alone would draw it upwards and backwards.

Latissimus Dorsi.—A flat, triangular muscle spread over the back and loins, where it commences in a broad aponeurotic tendon. It extends obliquely downward and forward over the side of the chest, and, gradually becoming narrower, passes between the fore-limb and the trunk to reach the humerus or upper arm bone.

Origin.—From the superior spines of all the lumbar and the fourteen posterior dorsal vertebræ.

Insertion.—By a short tendon into a small tubercle on the internal surface of the humerus or upper arm bone.

Action.—To flex the humerus on the scapula and incline the leg towards the trunk.

Serratus Anticus.—Situated on the side of the chest. The serratus anticus consists of a number of fleshy slips, whose fibres are directed backwards and end above in a flat aponeurotic tendon.

Origin.—From the 2nd to the 13th dorsal spines.

Insertion.—Into the anterior borders and outer surfaces of all the ribs from the 5th to the 13th.

Action.—By drawing the ribs forwards and upwards it enlarges the chest and assists in inspiration.

Serratus Posticus.—Situated behind the one last described, of which it seems to be a continuation. It is composed of a flat or aponeurotic tendon and a number of fleshy segments.

Origin.—From the spinous processes of the seven posterior dorsal vertebræ and the two anterior lumbar.

Insertion.—Into the outer surfaces and posterior borders of the eight or nine last ribs.

Action.—To pull the ribs backwards and assist in expiration.

Longissimus Dorsi.—This is the longest, the largest, and most powerful muscle in the body. It is situated on the arches of the ribs, in close connection with the spines of the dorsal and lumbar vertebræ, and extends from the ilium behind, over the loins and the back to the fourth cervical vertebra in front.

Origin.—From the internal surface and anterior border of the ilium or haunch bone, and the ligament (*sacro-iliac*) connecting it with the sacrum, and from the sacral bone.

Insertion.—It has numerous connections in its course towards the neck. 1. To the spinous, transverse, and articular processes of the lumbar vertebræ. 2. To the spinous and transverse processes of the dorsal vertebræ. 3. To the external surfaces of the 14th and 15th posterior ribs. 4. To the spinous processes of the last four cervical vertebræ.

Action.—Acting with its fellow on the opposite side, it extends the spine. By its attachments to the cervical vertebræ it raises and supports the neck, and by its connection with the ribs it assists in expiration. It is the principal muscle concerned in rearing, kicking, and jumping.

Transversalis Costarum.—This is a long, narrow muscle, stretching across the ribs a little distance from the spine.

Origin.—It is composed of two sets of tendons. By one set it arises from the transverse process of the first lumbar vertebra and the anterior borders of the ribs. By the other it is inserted into the posterior edges of the fourteen anterior ribs and into the transverse process of the last cervical vertebra.

Action.—To assist in expiration.

The Semispinalis of the back and loins.—This is situated on the sides of the spines of the dorsal and lumbar vertebræ, and extends along their entire length from the sacrum to the neck. It is made up of a number of short slips passing obliquely upward and forward.

Origin.—1. From the sacrum behind. 2. From the articular processes of the lumbar vertebræ. 3. From the transverse processes of the dorsal vertebræ.

Insertion.—Each slip becomes inserted into the spinous process of the third or fourth vertebra in front of the one from which it arises.

Action.—To fix the bones during the action of the large spinal muscle, and to assist in extending the spine.

Retractor Costæ.—A small, thin, triangular muscle arising from the transverse processes of the lumbar vertebræ.

Insertion.—Into the posterior border of the last rib.

Action.—To assist in expiration.

By some this muscle is considered to be part of the internal oblique muscle of the abdomen.

MUSCLES OF THE INFERIOR LUMBAR REGION

Psoas Magnus.—This is a broad, flat muscle placed beneath the loins, and extending from beneath the spine backward to the upper part of the thigh.

Origin.—From the bodies of the last two dorsal vertebræ, from the

under surfaces of the last two ribs, and from the transverse processes of the lumbar vertebræ.

Insertion.—By a short tendon common to this and another muscle—the iliacus—into the internal trochanter of the femur or thigh bone.

Action.—To flex the thigh on the pelvis and rotate it outwards. When both thighs are fixed it arches the back by flexing the spine. When a horse rears, this muscle is mainly concerned in preventing him falling backwards.

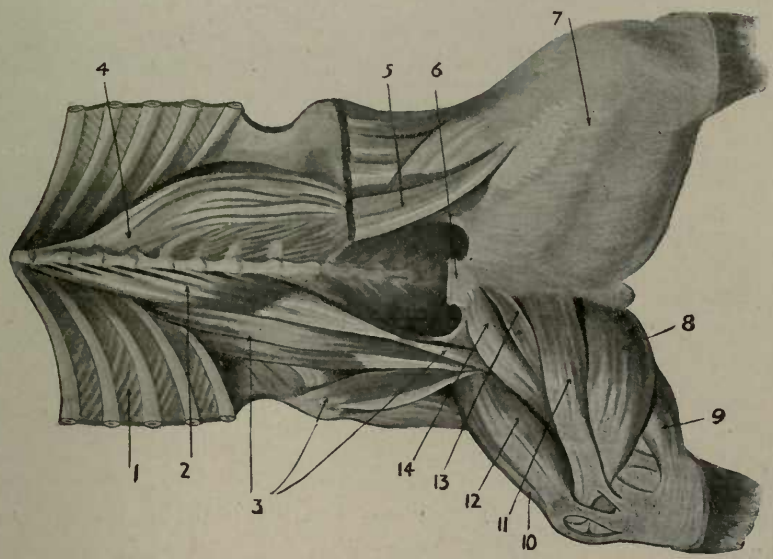


Fig. 376.—Muscles of the Lumbar and Pubio-Femoral Regions

1, Intercostal Muscles. 2, Psoas Parvus. 3, Iliacus. 4, Quadratus Lumborum. 5, Sartorius. 6, Pubic Tendon. 7, Fascia. 8, Adductor Magnus. 9, Semitendinosus. 10, Rectus Femoris. 11, Adductor Longus. 12, Vastus Internus. 13, Adductor Brevis. 14, Pectineus.

Psoas Parvus.—Situated beneath the loins on the inner side of the muscle last described.

Origin.—From the bodies of the three or four last dorsal and all the lumbar vertebræ.

Insertion.—To a small bony eminence (*ilio-pectineal*) on the front of the ilium.

Action.—When the loins are fixed, it draws the pelvis forward and flexes it on the spine. When the pelvis is fixed, it roaches the back.

Iliacus.—The iliacus is a stout, fleshy muscle, extending from the under part of the ilium or haunch bone to the thigh.

Origin.—From the under surface of the ilium.

Insertion.—To the small internal trochanter on the inner surface of the femur by a tendon common to this muscle and the psoas magnus.

Action.—To flex the femur on the pelvis and rotate the femur outwards.

Quadratus Lumborum.—Situated underneath the loins, and covered over below by the great psoas muscle. The quadratus lumborum is composed of several flat, narrow slips of muscle, whose fibres pass in a direction forward and inward, extending from the sacrum to the last rib but two.

Origin.—From the sacro-iliac ligament behind.

Insertion.—By its outermost slip to the posterior border of the last rib, by the others to the ends of the transverse processes of the lumbar vertebræ and the under surfaces of the three last ribs at their junction with the spine.

Action.—To draw the last rib backward and incline the lumbar vertebræ to one side.

Intertransverse Muscles of the Loins.—These are short, flat muscles filling in the spaces between the transverse processes of the lumbar vertebræ. They are attached to the anterior border of the transverse process of one vertebra and the posterior border of the one in front of it.

Action.—They incline the loins to one side.

MUSCLES OF THE TAIL

Erector Coccygis.

Origin.—From the sides and upper extremities of the three or four sacral spines.

Insertion.—To the superior surfaces of the tail bones by a succession of small tendons.

Action.—When acting with the corresponding muscle of the opposite side it would raise the tail. Acting alone, it would elevate it and incline it outwards.

Depressor Coccygis.—This muscle is situated beneath the tail, and consists of two muscular segments.

Origin.—From the under surface of the sacrum.

Insertion.—Into the inferior face of the bones of the tail.

Action.—It pulls the tail downward or to one side, according as it acts together with its fellow or alone.

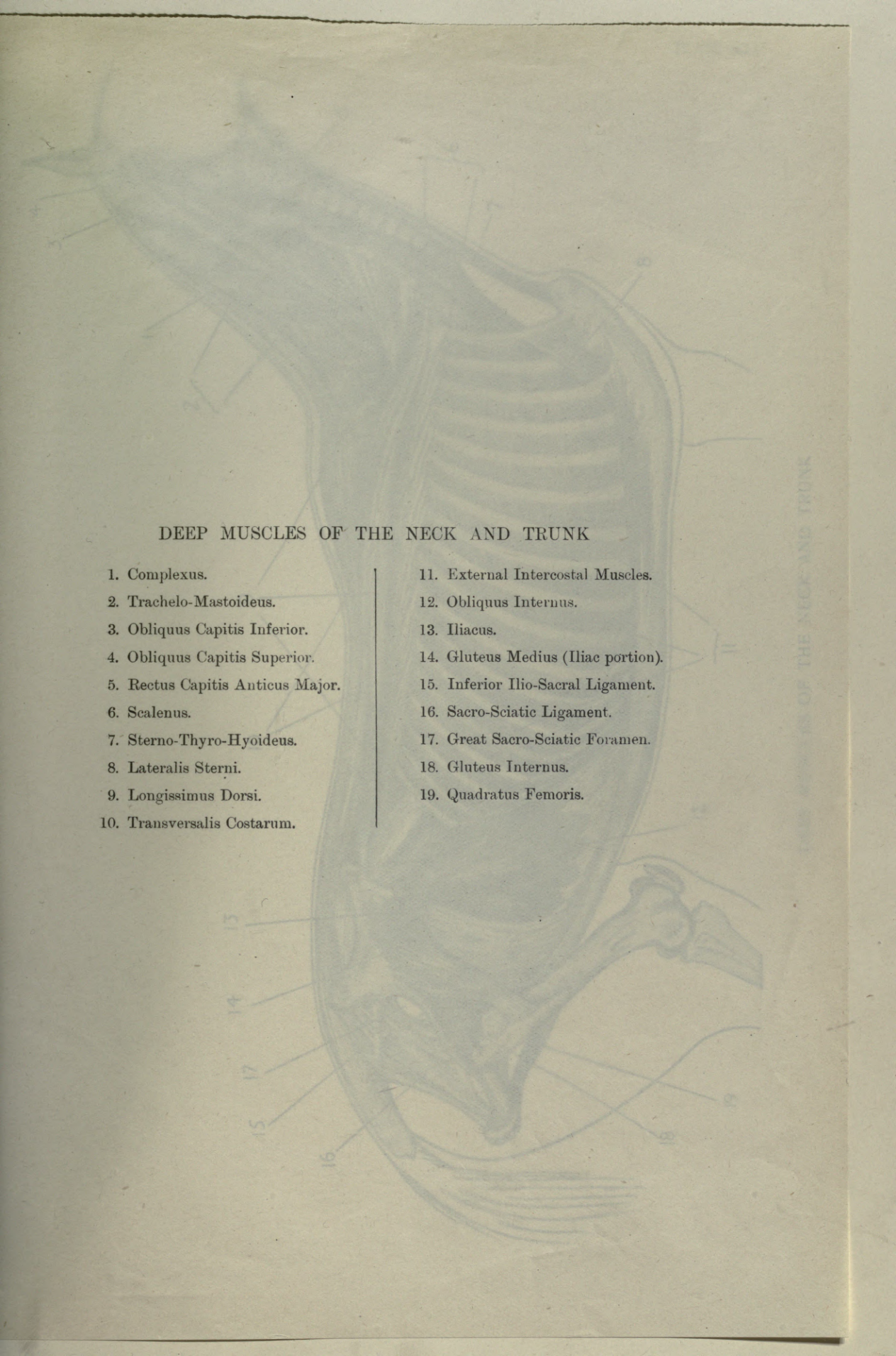
Curvator Coccygis.

Origin.—From the spines of the two or three posterior lumbar vertebræ and from the posterior sacral bones.

Insertion.—Into the side of the bones of the tail.

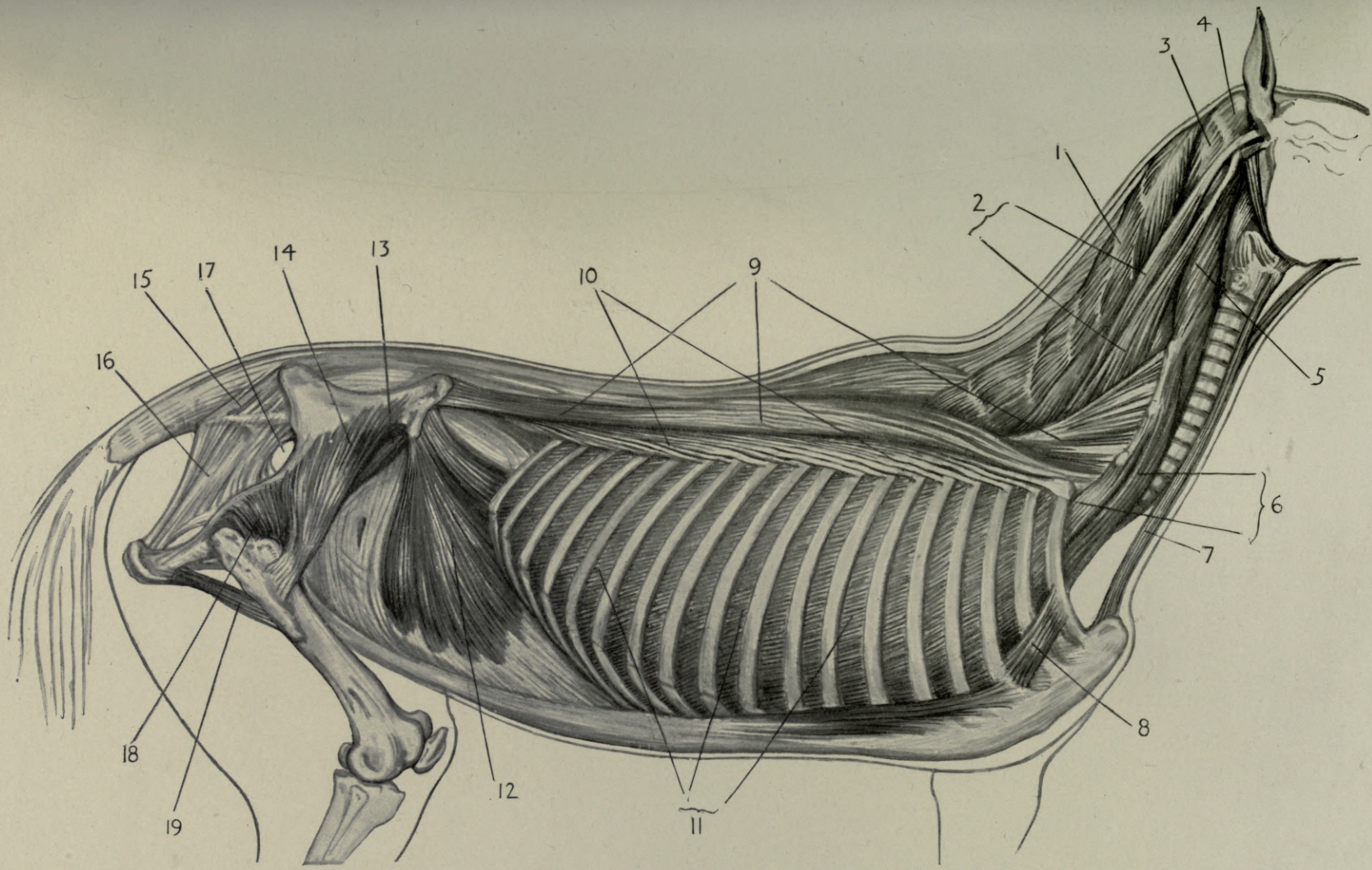
Action.—To move the tail to the side on which the muscle acts.

Compressor Coccygis.—A small triangular muscle situated at the posterior part of the pelvis.



DEEP MUSCLES OF THE NECK AND TRUNK

1. Complexus.
2. Trachelo-Mastoideus.
3. Obliquus Capitis Inferior.
4. Obliquus Capitis Superior.
5. Rectus Capitis Anticus Major.
6. Scalenus.
7. Sterno-Thyro-Hyoideus.
8. Lateralis Sterni.
9. Longissimus Dorsi.
10. Transversalis Costarum.
11. External Intercostal Muscles.
12. Obliquus Internus.
13. Iliacus.
14. Gluteus Medius (Iliac portion).
15. Inferior Ilio-Sacral Ligament.
16. Sacro-Sciatic Ligament.
17. Great Sacro-Sciatic Foramen.
18. Gluteus Internus.
19. Quadratus Femoris.



DEEP MUSCLES OF THE NECK AND TRUNK

PLATE XLI

Origin.—From the internal surface of the sacro-sciatic ligament, and from the ischiatic spine.

Insertion.—Into the last sacral and the two first coccygeal or tail bones.

Action.—This muscle forcibly depresses the tail.

AXILLARY REGION

Superficial Pectoral.—Situated on the inner aspect of the arm. It is broad above, and becomes narrower as it descends. In front it presents a thick fleshy mass, while its posterior part is flat and thin. This muscle forms the prominence so conspicuous in front of the breast.

Origin.—From the lower border of the sternum or breast-bone, where its fibres are interwoven with its fellow on the opposite side.

Insertion.—Into the ridge in front of the humerus bounding the musculo-spiral groove, and into the fascia covering the inner surface of the arm.

Action.—To adduct or draw the limb inward towards the trunk, and to tighten the fascia and brace the muscles of the arm.

By some anatomists this muscle is divided into two parts, termed the anterior and posterior superficial pectoral.

Anterior Deep Pectoral.—A long fleshy muscle extending from the side of the sternum upward in front of the scapula or blade-bone.

Origin.—From the side of the sternum and the cartilages of the first four ribs.

Insertion.—Into the fascia covering the external surface of the scapula.

Action.—To pull the scapula backwards and downwards.

Posterior Deep Pectoral.—This is a broad, flat muscle of considerable length. It extends from the under surface of the abdomen along the side of the chest to the inner aspect of the arm.

Origin.—From the fascia covering the under surface of the abdomen and the posterior part of the sternum.

Insertion.—Into the internal tubercle of the humerus, the tendon of origin of the biceps, and the fascia which binds it down to the bicipital groove.

Action.—To pull the scapula, and with it the limb as a whole, in a backward direction.

MUSCLES OF THE FORE EXTREMITY

EXTERNAL SCAPULAR REGION

Supraspinatus.—This muscle lies on the outer surface of the scapula or blade-bone, the anterior half of which it covers.

Origin.—From the whole of the outer surface of the scapula in front of its spine, and from the spine itself.

Insertion.—Below this muscle ends in two short tendons, which become inserted into the inner and outer tubercle on the head of the humerus respectively. The large tendon of the biceps passes between them.

Action.—To extend the humerus on the scapula.

Infraspinatus.—A fleshy muscle covering the posterior half of the external surface of the scapula.

Origin.—From the entire outer surface of the bone behind the central ridge or scapular spine.

Insertion.—By two short tendons, one into the outer tubercle of the humerus, the other into the upper part of the ridge beneath it. A synovial bursa intervenes between the latter and the external tubercle over which it plays.

Action.—It abducts the humerus or upper arm and rotates it outwards.

The Deltoid Muscle.—A short muscle on the outer aspect of the shoulder and arm.

Origin.—By a broad sheet of tendon from the scapular fascia, and from the posterior or dorsal angle of the scapula.

Insertion.—Into the external tubercle of the humerus.

Action.—To flex the humerus on the scapula and rotate it outwards.

Teres Minor.—Situated beneath the muscle last described.

Origin.—From the posterior border, and the lower part of the outer surface of the scapula.

Insertion.—Into the lower part of the bony ridge beneath the outer tubercle of the humerus.

Action.—To abduct the arm and rotate it outwards. Acting with the teres major, it bends the upper arm on the scapula.

INTERNAL SCAPULAR REGION

Subscapularis.—A broad, flat muscle covering over the internal face of the scapula or blade-bone, where it is lodged in a hollow or "fossa", which it fills.

Origin.—From the internal surface of the scapula.

Insertion.—Into the inner tuberosity on the head of the humerus. A small synovial bursa is interposed between the tendon and the bone.

Action.—To adduct or draw the shoulder towards the body.

Teres Major.—A narrow muscle tapering towards the extremities, and situated on the internal face of the shoulder.

Origin.—From the posterior or dorsal angle of the scapula, and from the fascia underlying the subscapularis in front of it.

Insertion.—With the latissimus dorsi, into a small tubercle on the inner surface of the humerus.

Action.—To flex the humerus on the shoulder and rotate it inwards.

Coraco-Humeralis.—A short muscle situated on the upper aspect of the humerus or upper arm-bone.

Origin.—From a small tubercle on the inner side of the lower extremity of the scapula.

Insertion.—By two divisions, one into the inner surface and the other into the front of the humerus.

Action.—To rotate the arm-bone inward and adduct the shoulder.

Scapulo-Humeralis Gracilis.—A very small slender muscle situated at the back of the shoulder-joint.

Origin.—From the lower part of the scapula behind, immediately above the articular cavity.

Insertion.—Into the posterior part of the humerus just below its head, and into the capsular ligament of the joint.

Action.—It prevents the capsular ligament of the shoulder-joint from insinuating itself between the two bones.

MUSCLES OF THE ARM

Flexor Brachii (Biceps of Man).—A long, round muscle with tapering ends, largely intersected with bands of tendinous tissue.

Origin.—From a bony projection (coracoid process) at the lower and front part of the blade-bone.

Insertion.—To a roughened bony eminence on the inner and upper part of the radius or lower arm, and by a band of fibrous tissue to the ensheathing fascia of the arm. The tendon of this muscle passes over the front of the shoulder-joint and then over the "bicipital groove" on the summit of the humerus.

Between the tendon and the groove there is a large synovial bursa to facilitate the play of the one over the other.

Action.—It flexes the fore-arm on the humerus, and by tightening up the investing fascia gives support to the muscles in this region.

Humeralis Externus.—This is a long fleshy muscle partly encircling the upper arm.

Origin.—It arises from the posterior part of the head of the humerus, and winds round the outer side of the bone in the furrow of torsion.

Insertion.—After crossing the elbow-joint, it becomes inserted partly into the inner side of the head of the radius and partly also into the ulna.

Action.—To flex the fore-arm on the humerus and rotate it outwards.

Scapulo-Ulnaris.—A broad, thin muscle extending from the scapula to the elbow, on the inner aspect of the arm.

Origin.—By a broad, thin aponeurotic tendon from the posterior border of the scapula.

Insertion.—Into the superior and posterior part of the olecranon or elbow and into the fascia of the arm.

Action.—To extend the lower on the upper arm, and to tighten the fascia of the fore-arm to give the muscles support.

Triceps Extensor Cubiti.—This is the largest muscle of the fore extremity.

It fills in the triangular space between the hinder edge of the shoulder and the point of the elbow. It is made up of three portions or heads, distinguished as the caput magnum or large head, the caput parvum or small head, and the caput medium or intermediate.

The caput magnum or large head arises from the posterior border of the scapula as high as the dorsal angle, and the caput medium arises from the upper and outer part of the humerus. The caput parvum arises from the inner face of the same bone.

Insertion.—All three divisions are inserted into the point of the elbow. A synovial bursa is interposed between the tendon of the caput magnum and the bone.

Action.—To extend the fore-arm on the humerus.

Anconeus.—A small fleshy muscle situated in the angle between the elbow and the arm.

Origin.—From the lower extremity of the humerus behind.

Insertion.—Into the anterior and outer part of the ulna.

Action.—To assist in extending the lower on the upper arm.

Flexor Metacarpi Internus (Internal Flexor of the Metacarpus or canon).—This muscle lies on the inner and back part of the radius or fore-arm, with which it is in contact.

Origin.—From the inner surface of the internal condyle of the humerus or upper-arm bone.

Insertion.—The tendon of insertion commencing some distance above the knee passes over a groove on the lower extremity of the radius, and

is there surrounded by a synovial membrane; continuing downwards, it becomes inserted into the head of the inner small metacarpal bone.

Action.—To flex the knee-joint.

Flexor Metacarpi Medius (Middle Flexor of the Metacarpus or canon).—Situated behind the fore-arm to the outer side of the preceding muscle. It is divided above into two parts, the posterior of which is the smaller.

Origin.—By its anterior and larger division from the internal condyle of the humerus immediately behind the internal flexor. By its posterior division from the upper and posterior part of the point of the elbow (olecranon).

Insertion.—Into the upper border of the pisiform bone.

Action.—To bend the knee.

Flexor Metacarpi Externus (External Flexor of the Metacarpus or canon).—Placed on the outer and posterior part of the fore-arm.

Origin.—From the point of the ridge on the outer and inferior extremity of the humerus.

Insertion.—By two tendons—(1) a broad flat one into the upper border of the pisiform bone; (2) a short round one into the head of the external small metacarpal bone. The latter passes over a groove and through a synovial sheath on the outer surface of the pisiform bone.

Action.—To bend the knee.

Flexor Pedis Perforatus.—Superficially placed behind the lower arm.

Origin.—From a ridge on the inner and inferior part of the humerus by a tendon common to this muscle and the flexor pedis perforans.

Insertion.—About the middle third of the radius the tendon of this muscle is joined by a strong band of fibrous tissue (superior check ligament). Its tendon then passes behind the knee, where it is enclosed in the carpal sheath, and, coursing its way downwards, ultimately divides into two short branches, which become inserted into the posterior upper border of the small pastern bone (second phalanx).

Action.—To flex the pastern and the knee.

Flexor Pedis Perforans.—This muscle is situated behind the lower arm, with which it is in contact. It is composed of three unequal portions —the humeral, the ulnar, and the radial. The humeral is much the largest of the three, and constitutes the chief bulk of the muscle.

Origin.—It arises (1) from a ridge on the inner and inferior part of the humerus; (2) from the upper and posterior part of the ulna; (3) from the posterior surface of the radius.

Insertion.—The three portions unite and form one common tendon,

which proceeds downwards to the foot. In its course it passes, in company with the flexor pedis perforatus tendon, over the back of the knee, where it is bound down by the carpal sheath and lubricated with synovia. Below the knee it is joined by a strong fibrous band, the check ligament or inferior carpal ligament. Thence it continues downward behind the canon, over the fetlock-joint, where it is encircled by a tendinous offshoot from the perforatus. Behind the pastern it passes between the divided tendon of the flexor pedis perforatus, and ultimately enters the foot, where, after widening out beneath the navicular bone, it becomes inserted into the under surface of the os pedis.

Action.—To flex the pastern on the fetlock, and through it the knee also.

Lumbricales.—These are two very small muscles, one of which is situated on each side of the tendon of the flexor pedis perforans.

Origin.—From the sides of the perforans tendon.

Insertion.—By a very fine glistening tendon into the fibrous pad behind the fetlock-joint.

Action.—No doubt at one time these muscles played an important part in the function of the foot, but in their present attenuated condition they serve but little or no purpose.

Extensor Metacarpi Magnus.—This is a muscle of considerable size and strength, and gives to the upper part of the arm in front its prominence and width.

Origin.—In common with the extensor pedis from the outer surface of the external condyle, and from the ridge above it.

Insertion.—By a strong tendon which, after passing over a groove on the lower part of the front face of the tibia and the knee-joint, becomes inserted into a bony prominence on the superior and anterior part of the large metacarpal or canon bone. In passing over the knee, the tendon of insertion plays through a synovial sheath, which facilitates its movements during flexion and extension of the joint.

Action.—To extend the canon and knee bones on the fore-arm.

Extensor Metacarpi Obliquus.—A small muscle placed on the outer side of the lower arm.

Origin.—From the external surface of the radius.

Insertion.—The tendon of this muscle passes obliquely forward and inward over a groove on the radius to reach the inner side of the leg, where it becomes inserted into the head of the inner small metacarpal or splint bone.

Action.—To extend the canon on the fore-arm and rotate it outwards.

Extensor Pedis.—This muscle lies on the outer part of the fore-arm, inclining to the front and immediately behind the extensor metacarpi

magnus. It consists of two unequal portions, each having a separate tendon.

Origin.—From the outer and lower part of the humerus, the lateral ligament of the elbow-joint, and the upper and outer part of the radius.

The two tendons of this muscle pass over a groove in front of the lower end of the fore-arm, then over the front of the knee-joint, where they are enclosed in a synovial sheath and bound down by the annular ligament of the knee. On reaching the canon, the outer tendon joins with that of the extensor suffraginis. The inner and main division proceeds downward over the front of the large metacarpal bone to the fetlock-joint, where it plays over a small synovial bursa. Lower down it is closely attached to the os suffraginis, or large pastern-bone, in the middle of which two branches of the suspensory ligament—an inner and outer—join it. Thus reinforced, it passes over the small pastern and enters the hoof.

Insertion.—Into the pyramidal process of the os pedis, or foot-bone.

Action.—To extend the fetlock on the canon and the knee on the fore-arm.

Extensor Suffraginis.—A small muscle situated on the outer part of the fore-arm, between the extensor pedis and the flexor metacarpi externus.

Origin.—From the external lateral ligament of the elbow-joint, and from the external tuberosity and outer side of the radius and ulna.

Insertion.—The tendon of this muscle, after passing over a groove on the inferior and outer part of the radius or fore-arm, and through a synovial sheath on the outer side of the knee, becomes united with the outer branch of the tendon of the extensor pedis and a fibrous slip from the external side of the carpus. Thus strengthened, it passes along the outer front part of the canon-bone to the fetlock-joint, where it plays over a synovial bursa and becomes inserted into the anterior and upper part of the first phalanx or large pastern.

Action.—To extend the fetlock on the canon and the knee on the fore-arm.

MUSCLES OF THE RIBS

Serratus Magnus.—A broad fan-shaped muscle situated on the side of the chest and partly concealed beneath the shoulder.

Attachments.—Below, to the outer surface of the first eight ribs, by a corresponding number of slips, which give it a serrated border from which it takes its name. Above, to the under surface of the upper extremity of the scapula or blade-bone.

Action.—When the horse occupies a standing position, this muscle, with its fellow on the opposite side, supports the trunk as if in a sling (fig. 44, Vol. I). When it acts from the chest it pulls down the posterior angle of the scapula and moves the point of the shoulder upward and forward. When the limb is fixed, it pulls the ribs upward and forward, and by enlarging the chest becomes a muscle of inspiration.

External Intercostal Muscles.—These form a series of thin, flat muscles occupying the spaces between the ribs from near the spine downward to their inferior extremities. The fibres take an oblique direction from before downward and backward. Each muscle *originates* from the posterior border of one rib and is *inserted* in the anterior border of the rib succeeding it.

Action.—To draw the ribs upward and forward and assist in inspiration.

Internal Intercostal Muscles.—Placed beneath the muscles last described. These also occupy the spaces between the ribs, and in addition extend between the sternal cartilages below. They resemble the external intercostals in their general form, but their fibres take an opposite course, viz. downward and forward, so that the two sets cross each other like the lines of the letter X.

Origin.—From the anterior borders of the ribs.

Insertion.—Into the posterior borders of the ribs in front.

Action.—To assist in expiration.

Levatores Costarum.—These are situated beneath the longissimus dorsi, and form a long series of small flat muscular slips passing downward and backward from the spine to the superior part of the ribs.

Origin.—They arise from the transverse processes of the dorsal vertebræ.

Insertion.—Into the outer surface of the rib behind the vertebra from which each respectively arises.

Action.—To draw the ribs forward and assist in inspiration.

Triangularis Sterni.—A flat muscle situated on the floor of the chest from one extremity to the other.

Origin.—From the superior surface of the sternum.

Insertion.—By a series of slips into the cartilages of the ribs, from the 2nd to the 8th.

Action.—To assist in expiration.

Lateralis Sterni.—A thin, narrow, flat muscle placed on the outer part of the chest in front.

Origin.—From the external surface of the first rib.

Insertion.—From its origin it passes obliquely downward and back-

ward, and is inserted into the outer part of the sternum and the 3rd and 4th sternal cartilages.

Action.—It is not definitely known whether it contributes to inspiration or expiration.

ABDOMINAL MUSCLES

Panniculus Carnosus.—This is a thin, broad sheet of muscular tissue spread over a large extent of the surface of the body, especially the sides of the shoulder, chest, and belly, the front of the neck, and the sides of the face. It is connected above and below with considerable aponeurotic tendons, which attach it to the dorsal and lumbar spines, the flank, the inner side of the arm, the neck, and the abdominal tunic.

Insertion.—By its fleshy fibres into the under surface of the integument. It is this muscle which imparts that vigorous movement to the skin when flies or other matters irritate it and require to be dislodged.

Abdominal Tunic.—When the panniculus carnosus is removed, a broad sheet of yellow elastic tissue is exposed, spread over the under surface and sides of the abdomen, to which the term "abdominal tunic" is given. This elastic layer is thick behind, and gradually thins as it passes forwards and upwards over the sides of the belly.

Posteriorly it divides and gives a layer to the sheath, which it supports as in a sling. In the stallion this segment is of considerable thickness, and assists in sustaining the penis when in a state of erection. It is known as the "suspensory ligament of the sheath".

In the female a similar division takes place, by which each milk-gland becomes invested in an elastic capsule. Generally considered, the abdominal tunic supplies a large bandage, which braces up the abdominal muscles and enables them to support the weight of the organs contained in the belly. In old brood mares it is of considerable thickness, owing to the additional weight imposed upon the walls of the belly during a succession of pregnancies.

The muscles proper to the abdomen are eight in number, four on either side. They comprise the external oblique muscles, the internal oblique, the transversalis, and the straight.

The three first named possess broad, aponeurotic tendons, all of which converge towards the centre of the belly and intermix their fibres, as a result of which a dense white band is formed, extending from the pubis behind to the sternum in front. This band is termed "linea alba" or white line. A little behind the middle of this line a lozenge-shaped space appears, in which the umbilical opening or navel originally existed.

Obliquus Abdominis Externus (External Oblique Muscle of the Abdomen).—This is the outermost and the largest of the abdominal muscles. It is broad behind and narrow in front, and gives off a wide aponeurotic tendon, which passes obliquely downward and backward.

Origin.—From the outer surface of the thirteen or fourteen posterior ribs and from the tendon of the latissimus dorsi.

Insertion.—Its fibres take an oblique direction downward and backward, and give off a wide aponeurotic tendon, which becomes inserted into (1) the linea alba in the centre of the belly, (2) the pubis, (3) the external angle of the ilium or haunch-bone. Between the two last named points of insertion the tendon forms an arch known as "Poupart's ligament". Near the pubis its fibres divide and form an elliptical opening, the external ring for the passage of the testicle into the scrotum.

Action.—To flex and arch the back and to assist in expiration. By forcible compression of the abdomen it becomes an active agent in urination, defœcation, and parturition.

Obliquus Abdominis Internus (Internal Oblique Muscle of the Abdomen).—Like the muscle last described, the internal oblique muscle is flat, and comprises a thick, fan-shaped fleshy portion spreading out from above forward and terminating in a broad aponeurotic tendon. It is situated in the region of the flank, and its fibres proceed from behind downward and forward, and in so doing cross those of the external oblique muscle as they pass backwards.

Origin.—From the external angle of the ilium or haunch-bone, and the contiguous fibres of Poupart's ligament.

Insertion.—Into (1) the symphisis pubis, (2) the linea alba, (3) and the cartilages of the last four or five ribs.

Action.—The same as the external oblique.

Rectus Abdominis (Straight Muscle of the Abdomen).—A long, somewhat wide muscle passing from the sternum or breast-bone in front to the pubis behind. It is situated between the broad tendons of the internal oblique and the transversalis muscles, and forms the principal part of the floor of the abdomen. It is marked by a number of transverse lines (lineæ transversæ), due to short tendinous intersections. It joins its fellow in the middle line of the belly.

Origin.—From the sternum, and cartilages of the ribs from the 5th to the 9th.

Insertion.—Into the anterior border of the pubis.

Action.—To flex the spine, and, by compressing the abdomen, to assist in expiration, urination, defœcation, and parturition.

Transversalis Abdominis (Transverse Muscle of the Abdomen).—The innermost of the abdominal muscles. Like those already referred to, it consists of a flat fleshy portion and a broad aponeurotic tendon.

Origin.—From the lower extremities of the false ribs, and from the transverse processes of the lumbar vertebræ.

Insertion.—Into the linea alba and the ensiform cartilage. The internal surface of this muscle is covered by peritoneum.

Action.—The same as the oblique muscles.

Diaphragm or Midriff.—The diaphragm is the muscular and tendinous partition which divides the chest from the abdomen (fig. 377).

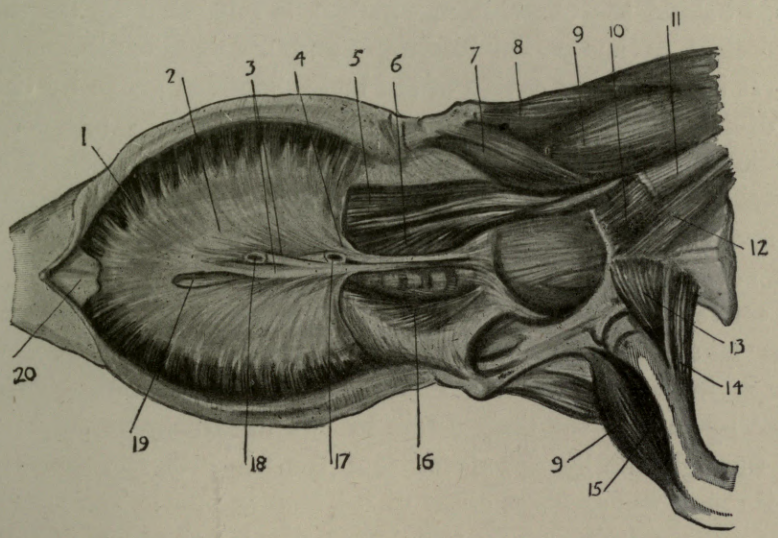


Fig. 377.—The Diaphragm and Sub-lumbar Muscles, seen from below

1, Fleshy periphery of Diaphragm. 2, Tendinous centre of Diaphragm. 3, Right Pillar. 4, Left Pillar. 5, Psoas Magnus. 6, Psoas Parvus. 7, Iliacus Internus. 8, Tensor Fasciæ Latæ. 9, 9, Rectus Femoris. 10, Adductor Longus. 11, Sartorius (cut to show underlying muscle). 12, Gracilis. 13, Obturator Externus. 14, Quadratus Femoris. 15, Crureus. 16, Quadratus Lumborum. 17, Hiatus Aorticus and posterior aorta. 18, Foramen Sinistrum and Œsophagus. 19, Foramen Dextrum and Vena Cava. 20, Ensiform Cartilage.

It passes obliquely downward and forward from the spine above to the sternum below. It is convex in front and concave behind. The muscular portion is situated around the circumference, and encircles a broad, flat, glistening tendon. Connected with the latter are two fleshy bundles situated in the centre towards the spine; these are known as the *pillars* of the diaphragm, and are united with the tendinous portion in the centre. Three openings are observed in this partition. 1. The *Foramen sinistrum*, through which the œsophagus or gullet passes from the chest into the abdomen. This is situated above, a little to the left of the middle line. 2. The *Foramen dextrum*, by which the posterior vena cava reaches the chest. It passes through the middle of the central tendon. 3. The

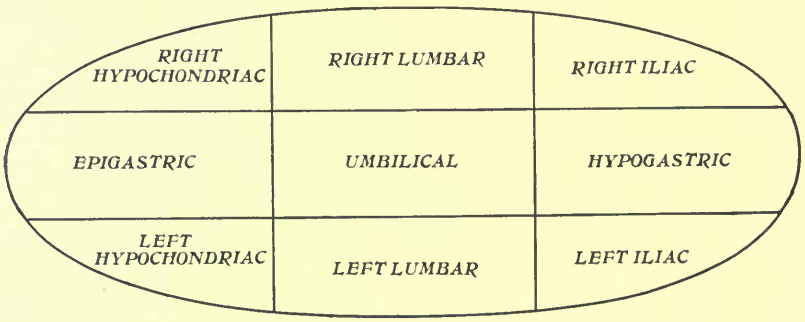
Hiatus Aorticus gives passage to the posterior aorta, the vena azygos, and the thoracic duct. It is situated immediately beneath the spine, and is formed by the separation of the two muscular pillars.

Action.—When the diaphragm contracts it passes in a backward direction, and in so doing enlarges the chest so that the lungs may be filled with air. It is, therefore, a muscle of inspiration.

THE ABDOMINAL CAVITY, OR CAVITY OF THE BELLY

Placed behind the chest, from which it is separated by the diaphragm, the abdominal cavity passes backward and becomes continuous with the pelvis. It is the largest cavity of the body, bounded above by the loins or lumbar division of the spine, below and at the sides by muscles, tendons, and elastic tissue, already described. Contained within it are the stomach and bowels, the liver, pancreas, spleen, kidneys, and numerous vessels, nerves, and lymphatic glands. In the female it also contains the ovaries and the horns of the uterus.

For convenience of description of the position of parts within it the abdomen is arbitrarily divided into nine portions, of which three are situated in front, three in the middle, and three behind. This division is effected by cutting the body across by two imaginary vertical planes, one passing through the lower extremity of the fifteenth rib, the other transversely through the external angle of the haunch-bone. The three divisions thus made are subdivided by two longitudinal planes which fall through the centre of Poupart's ligament on the right and left side respectively, and cut each of the three primary divisions into a central and two lateral portions. As a result of this we get the nine parts described and figured below.



MUSCLES OF THE CROUP

Superficial Gluteus.—The most superficial muscle of the croup. It is V-shaped, and situated immediately beneath the gluteal fascia.

Origin.—By its anterior arm from the point of the ilium or haunch-bone. By its posterior arm from the gluteal fascia. Passing downward these two branches converge and unite.

Insertion.—Into the trochanter minor externus, a bony prominence on the outer face of the thigh-bone.

Action.—To abduct or draw the thigh outward.

Middle Gluteus.—This is a thick, broad, fleshy muscle to which the croup owes its characteristic roundness. In a forward direction it extends for some distance over the loins, and terminates behind in the upper extremity of the femur or thigh-bone.

Origin.—(1) From the superior surface of the longissimus dorsi in front. (2) From the superior or dorsal surface of the ilium, and the sacro-sciatic and the ilio-sacral ligaments.

Insertion.—By three branches into the upper extremity of the femur.

Action.—To extend the thigh on the pelvis and incline the entire limb outwards. When the hind limbs are fixed it assists in rearing. Acting from before as a fixed point it takes part in kicking.

The Deep Gluteus.—A small but strong muscle placed between the one last described and the hip-joint.

Origin.—From the superior surface of the ilium and from the ischium above the hip-joint.

Insertion.—Into the margin of the lower division of the great trochanter of the femur.

Action.—To abduct the limb and rotate it inwards.

MUSCLES OF THE HIP AND THIGH

Tensor Vaginæ Femoris.—A thin triangular muscle situated in front of the thigh, having its base directed downwards. By its posterior border it is intimately connected with the anterior branch of the superficial gluteal muscle, and below it gives off a somewhat broad aponeurotic tendon.

Origin.—From the external angle of the ilium or haunch-bone.

Insertion.—Into the fascia lata, or membrane investing the muscles of the second thigh.

Action.—It braces up the muscles and flexes the thigh on the pelvis.

Rectus Femoris (Straight Muscle of the Thigh).—This is a thick, rounded muscle covering the front of the femur.

Origin.—By two short tendons, one from the upper and the other from the under surface of the ilium in front of the hip-joint.

Insertion.—Into the upper and anterior part of the patella.

Action.—To flex the femur on the pelvis and extend the tibia or lower thigh on the stifle.

Vastus Externus.—A fleshy muscle covering the whole of the outer surface of the thigh-bone.

Origin.—From the outer surface and front of the femur.

Insertion.—Into the upper and outer part of the patella or "knee-cap" of the stifle-joint.

Action.—To extend the tibia or lower thigh-bone on the femur.

Vastus Internus.—A thick fleshy muscle lying on the inner face of the thigh-bone.

Origin.—From the internal surface and front of the femur.

Insertion.—Into the upper part of the patella and its internal lateral ligament.

Action.—To extend the tibia on the femur.

Rectus Parvus.—A small short muscle placed in front of the hip-joint immediately in contact with the capsular ligament.

Origin.—From the ilium above and in front of the joint. It passes between the vastus externus and internus.

Insertion.—Into the superior part of the femur in front.

Biceps Femoris.—A long, thick, fleshy muscle extending from the superior part of the croup to the stifle. It is narrow above and widens out below, where it is divided into three segments.

Origin.—From the superior spines of the sacrum, the sacro-sciatic ligament, the gluteal and coccygeal fascia, and the tuberosity of the ischium.

Insertion.—By the three lower divisions: (1) Into the anterior part of the patella or knee-cap; (2) into the crest of the tibia; (3) into the fascia of the leg.

This muscle is maintained in its position behind the femur by a strong band of connective tissue which attaches it to the upper and posterior part of that bone.

Action.—It flexes the tibia or leg-bone on the femur, and, acting with its fellow on the opposite side, it assists in supporting and balancing the body in the act of rearing.

The Semitendinosus.—Situated immediately behind the biceps. A long fleshy muscle arising by two heads, and extending from the summit of the haunch to the superior part of the tibia.

Origin.—By one head from the spines of the sacrum and the sacro-sciatic ligament, and by the other from the tuberosity of the ischium.

Insertion.—Into the crest of the tibia and the fascia of the leg.

Action.—To flex the stifle and rotate the leg inwards. It also assists in the act of rearing, and braces up the fascia of the leg in support of the muscles.

Semimembranosus.—A somewhat considerable muscle placed behind and to the inner side of the one last described, and extending from the root of the tail downward to the inferior extremity of the thigh.

Origin.—From the under surface of the ischium and its tuberosity, and from the fibrous aponeurosis at the base of the tail.

Insertion.—Into the internal condyle of the femur.

Action.—To adduct the limb and extend the thigh on the pelvis. When the femur is fixed it assists in rearing.

INTERNAL CRURAL REGION

Sartorius.—This is a long slender muscle partly contained in the abdominal cavity, after leaving which it traverses the inner part of the thigh.

Origin.—From the fascia (iliac fascia) on the under surface of the ilium or haunch-bone.

Insertion.—Into the internal straight ligament of the patella.

Action.—To adduct the leg and flex the femur on the pelvis.

Gracilis.—A flat four-sided muscle situated beneath the skin in the inner aspect of the thigh, which it wholly covers.

Origin.—From the under surface of the pelvis along the side of the ischio-pubic symphysis, where its fibres interlace with those of its fellow on the opposite side.

Insertion.—Into the internal straight ligament of the patella and the internal face of the tibia.

Action.—To adduct the leg and brace up the fibrous investment of the leg (tibial aponeurosis).

This muscle is attached to the sartorius in front.

Pectineus.—The pectineus is a conical muscle, with its base directed upwards. It is divided above by the pubio-femoral ligament which passes between its two segments on its way to the hip-joint.

Origin.—By two branches from the under surface of the pubis.

Insertion.—Into the inner surface of the thigh-bone about its middle.

Action.—To adduct and flex the thigh and rotate it inwards.

Adductor Parvus.—A small muscle deeply situated in the substance of the thigh.

Origin.—From the under surface of the pubis.

Insertion.—Into the middle of the posterior aspect of the femur.

Action.—To adduct the limb and rotate it outwards.

Adductor Magnus.—A long thick muscle placed on the inner part of the thigh.

Origin.—From the under surface of the ischium and from the tendon of the gracilis.

Insertion.—By two divisions: (1) Into the posterior surface of the middle third of the femur; (2) into the same bone above the internal condyle. The femoral artery passes between the two insertions.

Action.—To adduct the limb.

Quadratus Femoris.—This is a small flat band lying deep in the substance of the thigh behind.

Origin.—From the under surface of the ischium in front of the tuberosity.

Insertion.—Passing in a forward and downward direction it becomes inserted into the posterior aspect of the femur, a little below the bony projection (trochanter minor internus) on the inner side of the bone.

Action.—To extend the femur on the pelvis and adduct the leg.

Gemelli.—A small, flat, thin muscle situated behind the last described.

Origin.—From the external border of the ischium.

Insertion.—Its tendon joins with those of the obturator internus and pyriformis, and the three together become inserted into the trochanteric fossa (a pit behind the head of the thigh-bone).

Action.—To rotate the femur outwards.

Obturator Externus.—This is a small, thin, flat muscle situated beneath the pelvis. It covers the obturator foramen, and its fibres converge outwards, and end in a short flattened tendon.

Origin.—From the under surface of the pubis and ischium.

Insertion.—Into the trochanteric fossa behind and below the head of the femur.

Action.—It assists in extending the femur on the pelvis and rotating the hip outwards.

Obturator Internus.—A small flat muscle situated on the floor of the pelvis, where it is spread over the obturator foramen.

Origin.—From the inner circumference of the obturator opening.

Insertion.—By a tendon common to this muscle and the pyriformis to the large depression (trochanteric fossa) on the upper and back part of the femur.

Action.—It rotates the femur outwards.

Pyriformis.—A small flat muscle situated within the pelvis.

Origin.—From the internal surface of the ilium near the hip-joint.

Insertion.—Into the trochanteric fossa, a deep cavity behind and below the head of the thigh-bone.

Action.—To rotate the femur outwards.

MUSCLES OF THE LEG

OUTER ASPECT OF THE LEG

Extensor Pedis.—This muscle is situated on the outer and front aspects of the limb between the stifle and the hock-joint. It is thick in the middle and tapering towards the extremities.

Origin.—By a short strong tendon (together with a branch from the flexor metatarsi) from a depression on the inferior extremity of the femur between the trochlea and the external condyle.

Insertion.—The tendon, which commences above the hock, is tied down by three transverse bands, one above the hock, another below it, and a third in front of it. It then passes in front of the canon, where it is joined by the tendons of two muscles, viz. the peroneus and the flexor metatarsi parvus. In passing over the fetlock-joint a synovial bursa intervenes between it and the capsular ligament. About the middle of the first phalanx (suffraginis) it is joined on either side by a strip from the suspensory ligament, and ultimately becomes attached to the coronal process of the os pedis, or foot-bone.

Action.—To extend the foot and pastern and flex the hock.

Peroneus.—A small elongated muscle placed behind the one last described on the outer side of the leg.

Origin.—From the outer part of the fibula and the external lateral ligament of the stifle.

Insertion.—The tendon of the peroneus in its downward course passes over a groove on the outer and lower extremity of the tibia or leg-bone, thence over the outer side of the hock-joint, where it is contained in a canal and invested by a synovial sheath. On emerging from its enclosure it passes obliquely forward and joins the tendon of the extensor pedis in the middle of the canon.

Action.—To assist the last-named muscle.

Flexor Metatarsi.—The flexor metatarsi is placed on the anterior and outer face of the tibia, and extends from the stifle to the hock-joint.

Origin.—A tendinous band from this muscle blends with the tendon of origin of the extensor pedis, and is attached to the lower extremity of the femur between the external condyle and trochlea. The muscular division is connected with the upper and outer part of the tibia.

Insertion.—In front of the hock the tendon breaks up into several branches, which become inserted into the front of the upper extremity of the large metatarsal bone (canon) and into the small bones of the hock. One of these branches passes over a synovial membrane on the cuneiform parvum.

Action.—To flex the hock.

Extensor Brevis.—A short, flat, thin muscle situated in front and below the hock-joint beneath the tendons of the extensor pedis and peroneus.

Origin.—From the outer part of the os calcis and the astragalus.

Insertion.—Into the extensor pedis tendon.

Action.—To assist the extensor pedis.

POSTERIOR ASPECT OF THE LEG

Gastrocnemius.—A short stout muscle situated behind the leg. It consists of two separate portions, which converge and unite below to form a single strong tendon.

Origin.—From either side of the supracondyloid fossa at the lower and back part of the femur.

Insertion.—Into the middle of the summit of the os calcis, or point of the hock. A small synovial bursa is interposed between the anterior face of the tendon and the portion of the os calcis in front of it. By this means the parts move freely over each other when the hock is flexed.

Prior to its insertion into the point of the hock the tendon of this muscle is joined by that of another small muscle—the soleus.

Action.—To extend the hock.

Soleus.—A small muscle situated on the outer aspect of the leg.

Origin.—From the outer surface of the head of the fibula.

Insertion.—Into the tendon of the gastrocnemius.

Action.—To assist in extending the hock.

Flexor Pedis Perforatus (Superficial Flexor of the Pastern).—This is a round cord-like muscle in which tendinous tissue predominates. It is placed in front of the gastrocnemius, which completely covers it.

Origin.—From a deep depression (supracondyloid fossa) at the inferior and posterior part of the femur. In passing down the leg the tendon of this muscle gets behind the gastrocnemius tendon by winding round its inner side. It then spreads out and becomes attached by means of short tendinous slips to either side of the point of the hock to which it now forms a cap. A small synovial bursa is interposed between the two parts to facilitate the movement of one upon the other.

Insertion.—Continuing its course down the back of the canon it ultimately divides into two branches and becomes inserted into the upper and posterior part of the second phalanx or small pastern-bone. The perforans tendon passes between these two branches on its way to the foot.

Action.—To flex the pastern on the fetlock-joint, and extend the hock on the tibia.

Popliteus.—Situated behind the stifle-joint, over which it passes obliquely downward and inward in close contact with the upper extremity of the tibia.

Origin.—From the external condyle of the femur by a short tendon which is lubricated with synovia in passing over the joint.

Insertion.—Into the upper and posterior part of the tibia.

Action.—To flex the tibia on the femur, and rotate it inwards.

Flexor Pedis Perforans (Deep Flexor of the Foot).—A long muscle situated behind the tibia or leg-bone, with which it is in contact.

Origin.—From the posterior surface of the tibia and the fibula.

Insertion.—After passing over the back of the hock, where it moves through a synovial membrane and is bound down by the tarsal sheath, the tendon of this muscle continues its course downward, and becomes inserted into the under surface of the pedal or foot-bone.

About the upper third of the metatarsus or canon it is joined by the check ligament, as in the fore-limb.

Action.—It flexes the foot and fetlock, and assists in extending the hock.

Flexor Pedis Accessorius (Accessory Flexor of the Foot and pastern).—A small muscle situated at the back of the leg on the inner side of the one last described.

Origin.—From the upper and back part of the head of the tibia or leg-bone.

Insertion.—After passing through a groove on the inner side of the hock-joint, where it is lubricated with synovia, the tendon of this muscle continues downward to blend with that of the flexor pedis perforans about the upper third of the canon bone.

Action.—To assist in flexing the foot and fetlock.

18. DISEASES OF THE JOINTS, MUSCLES, TENDONS, AND LIGAMENTS

(See also pp. 279–305)

DISLOCATIONS

Dislocation results where the articular ends of bones which enter into the formation of a joint are displaced.

Bones forming joints are held together by ligaments and muscles. When dislocations occur these are sprained or ruptured to a greater or less degree in the forcible separation of the bones.

Dislocations may be divided into *congenital*, and *acquired* or *accidental*, in each of which displacement may be only partial or complete. In the former it is invariably brought about by some arrest of development, or injury to parts sustained during gestation.

"At the period of birth we occasionally meet with congenitally malformed limbs, depending either on the flexors or the extensors being too short. It is by far most commonly the flexors which are implicated, thus causing the animal to go on his toes, thereby distorting the limb or limbs. This distortion may be so slight, that in the process of development, if due attention be paid to the shape and position of the feet, no operation, either mechanical or surgical, is required. But should the limb be to a greater extent malformed, it will be necessary to pay even more than usual attention to the feet, and, as soon as time will admit of shoes being placed on them, let it be done. These shoes should have a piece of iron projecting from the toe, from 2 to 3 inches in length, and slightly curved upwards (fig. 380). At the same time the heels must be kept low.

"The kinds of deformities met with in the growing horse are: first, congenital and extreme flexure of the pedal bone upon the os corona (Plate XLII, fig. 1), depending upon the perforans tendon being too short; secondly, permanent flexure of the pastern bones upon the large metacarpal bone (Plate XLII, fig. 2). The perforatus tendon being too short will be found productive of this distortion; sometimes it is also connected with disease of the dense membranous sheath which invests it posteriorly. Depending upon the degree or angle at which the bones are placed, must be our remedial measures. If the distortion be but slight, mechanical means only need be resorted to; if greater, a surgical operation conjoined with some mechanical contrivance will be found to be absolutely necessary.

"In the second instance, where the extensors are too short the toe

MALFORMATIONS OF THE LEGS

1. Contraction of Perforans tendon. 2. Contraction of Perforatus tendon. 3. Contraction of Perforatus and Perforans tendons. 4. Contraction of Extensor Pedis tendon. 5. Overshot Fetlock Joint. 6. Contraction of Subcarpal or Check Ligament.

will be turned up (Plate XLII, fig. 4), the animal going on the posterior part of the foot and maybe the fetlock. This depends upon the tendon of the extensor pedis being too short. The ligament also, which extends from the outer and inferior part of the knee to the upper and anterior part of the first phalanx, takes its share in producing this effect. Here also, as in the first instance, must our remedies be regulated by the amount or degree of distortion.

"Thirdly,—Occasionally we meet with instances of a bowing outwards of the fetlock-joints. In such cases the external lateral ligaments are too long, and the internal ones too short. Or in others, which are rare, the reverse of this exists; when the fetlock-joints will approach each other too near, the feet turning outwards. Of course, under such circumstances, the lateral ligaments would be the reverse of the former as to their comparative length. In either instance we should not be justified in resorting to any surgical operation. In some slight cases, if proper attention be paid to the shape of the feet during the period of development, much may be done towards improving the position of the bones we are now considering.

"Another kind of deformity often exists below the parts we have been describing, namely, at the joints formed by the pedal bone and os coronæ, and to a slight extent between the os coronæ and os suffraginis. This, although there may be a natural tendency to it, often develops during the growth of the animal, from a neglect of those who superintend the rearing of colts, especially as to the wearing away of the hoofs; allowing the inner and front part of the foot to be elongated, thereby throwing the weight and the wear upon the outside of the foot, and thus producing that condition commonly called 'pigeon-toed'. Or, on the other hand, the outer and anterior part of the hoof may become similarly elongated, and the weight is then thrown upon the inner side, the effect of which is obvious.

"In a horse with congenital malformed limbs, the bones, in the process of growth, become fashioned to the form of the limb, so that if the animal be neglected until he has arrived at adultism, no procedure, either surgical or mechanical, will produce the effect we are desirous of obtaining. But during growth, the parts being then pliable, by altering the position of the foot, and by some contrivance placing the limb in a state favourable to cause a proper development, our object may be gained.

"In young horses it is common to meet with a knuckling forwards of the hind fetlocks (Plate XLII, fig. 5), so much so that at times the front of the joint is on a perpendicular line with the toe. This condition is seen in most cases only at times, generally when the animal is standing; or,

he may walk in this manner, except at intervals. The veterinary surgeon is often called upon to give an opinion respecting these cases. He examines the joints by careful manipulation, and he minutely traces the tendons along their length, but finds no lesion of any kind present. There may be, however, more or less fulness of the bursæ above the fetlock. The question has often been asked: 'What is the pathology of this affection, and what parts are implicated which cause the animal to place himself in this position?' It seems to be a commonly received opinion that putting horses to hard work too early is the principal exciting cause, and the result of my own observations leads me to think that this is correct. It is likewise asserted by some persons, that bad constitutions, independent of early and hard work, tend to induce it. This probably may be the case; still, we see the affection in horses having the best constitutions. Colts with naturally formed upright pasterns are, if worked too early, particularly predisposed to become thus affected.

"The next question is: What can be done to restore the parts to their normal condition? At this stage of the affection no operation is indicated, because we can detect no shortening of the tendons or ligaments. I would advise that the animal be thrown altogether out of work; that mild blisters be applied to the fetlock-joints, and repeated a second or a third time; after which the horse should be allowed as long rest as may be considered necessary. But even after this, the owner must not be too sanguine as to the benefit to be derived from such treatment. If due time is allowed, the horse may return to his work and show no signs of his former affection, and in some instances he will continue sound; but it is more likely, after having been worked hard for a time, we shall find that the parts will return to the same condition as at first. This may continue for an indefinite period, depending upon the severity of the work the animal is put to, before the affection merges into permanent flexure of the fetlock-joint. If we now examine the limb from a little above the fetlock posteriorly downwards to the insertion of the perforatus tendon, we shall detect a rigidity of structure, which in most cases is attended with thickening. Nothing now will restore the limb to its former position but an operation, and the propriety of its being performed we will now consider.

"The incapability to extend the foot depends, no doubt, as in all deformities of the kind, upon the length of the tendons or ligaments, between their two fixed points, being from some cause or other diminished. We shall here find that this abnormal condition of the tissue exists at such a part as either forbids or allows of relief by operation, which is the only means by which the obstacle to either flexion or extension

can be remedied. The cases referred to, in most instances, depend on the perforatus and its outer dense fibrous membrane, extending from the superior part of the sesamoid bones to where the tendon becomes inserted into the supero-posterior part of the os coronæ, and which is continuous with the fibrous frog, becoming more or less thickened, and sometimes semi-cartilaginous; consequently they are shortened at this particular part. Taking a view of the anatomical relationship of these structures, forming as they do a synovial sheath for the perforans, and also their pathological condition, we should not be justified in using the scalpel, especially as the only chance of effecting our object would be by operating below the fetlock-joint, and this we should not be warranted in doing."—*Varnell.*

ACCIDENTAL DISLOCATIONS

Accidental dislocations are as numerous almost as the joints themselves; horses, by the nature of their employments and the dangers to which they are exposed, incur injuries which dislocate and damage the joints of the limbs, and less frequently those of the spine and other parts of the skeleton. The liability to dislocation is much greater in some joints than in others. This depends partly on the form and character of the joint itself, and partly also on the strength of the ligaments and muscles which unite and support it. The rarity of dislocation of the hip is due to the depth of the cup into which the head of the femur fits, and the strength of the ligaments and muscles which bind them together. The relative frequency of luxation of the patella may be ascribed to the facility with which the bone is under some circumstances enabled to glide over the outer small ridge of the femur upon which it plays.

Luxation of certain bones, notably the patella, is sometimes due to extreme debility and weakness, while in others it follows upon contraction of the tendons induced by hard work, sprains, and other injuries, familiar examples of which are to be seen every day in our streets. "Upright" is the term used to denote such cases of partial dislocation occurring in the region of the pastern; but they are not infrequently seen in a condition in which the lower extremity of the canon-bone projects beyond the level of the articular surface of the suffraginis, or upper pastern-bone.

SHOULDER SLIP

By this term is understood a loosening of the union between the bones forming the shoulder-joint, in consequence of which the head of the humerus or arm-bone is outwardly displaced from the shallow cavity into which it fits on the lower end of the scapula or blade-bone. This disease is invariably associated with paralysis of the muscles of the shoulder, which sooner or later waste, and by ceasing to give support to the joint allow the bones to become displaced, and the limb as an organ of support to be weakened and deformed. It is more especially seen in young horses engaged in agricultural work, although adults are by no means exempt from it.

Causes.—The precise origin of the disease is but imperfectly understood. That the muscles of the shoulder are paralysed is clear enough, but as to how that paralysis is brought about there is considerable diversity of opinion. By some it is regarded as the result of an injury to the supra-scapular nerve by blows, and over-stretching in the performance of certain backward movements of the shoulder and limb, involving great strain. By others it is said to arise out of inflammation of the muscles of the shoulder, induced by the stretching they undergo when slipping in and out of the furrow in the act of ploughing, and in habitually walking on an irregular surface. Of the two alleged causes our view is in favour of the former. We cannot understand shoulder-slip being of such rare occurrence in face of the very large number of young horses which are every day at plough, following the occupation which is said to induce it.

Symptoms.—These vary somewhat in different cases as far as refers to the onset of the disease. In some there are no clearly-defined local symptoms until the muscles have become noticeably atrophied, and as they waste the shoulder is seen to shrink, leaving the spine in the centre of the blade-bone standing out prominently as a sharp projecting ridge with a hollow on either side. At the same time the point of the shoulder bulges outward, and the foot of the affected limb is drawn inward towards the other one, so that the leg, instead of following a straight line from the shoulder to the ground, takes a slanting direction inwards. In respect to locomotion, the main features of these cases are a disposition to trail the toe, inability to bring the limb well forward, and the outward movement which it describes when an attempt is made to do so. When the weight of the body is placed upon it, the shoulder is forced outward, and there is a perceptible descent of the quarter on the affected side.

These symptoms may be preceded by more or less heat and swelling in

the region of the joint, which subsides as the disease progresses and the muscles waste.

Treatment.—Rest from work in a straw yard or paddock is the first requirement to be complied with, but in no case should the animal be confined to the stable. Movement is most desirable as a means of exciting nutrition and restoring wasted muscles, so long as it is not carried beyond mere exercise. The frequent application of stimulating embrocations over the affected region, with vigorous rubbing, is also recommended to the same end.

With regard to general treatment, nux vomica and sulphate of iron in two-drachm doses will benefit the local ailment by improving the general health and toning up the wasting muscles. To this must be added good food in liberal rations.

DISLOCATION OF THE PATELLA

The patella is a small floating bone situated at the point of the stifle and corresponds to the knee-cap of man (fig. 378). It enjoys a large range of up-and-down motion in playing over two prominent ridges on the lower extremity of the femur or thigh-bone. The outer ridge is naturally much smaller than the inner one, and this will require to be borne in mind when considering the particular direction in which the displacement usually occurs. Moreover, a large muscle, the "biceps femoris", is inserted in the outer part of the patella, to which there is no corresponding muscle on the inner side in antagonism with it.

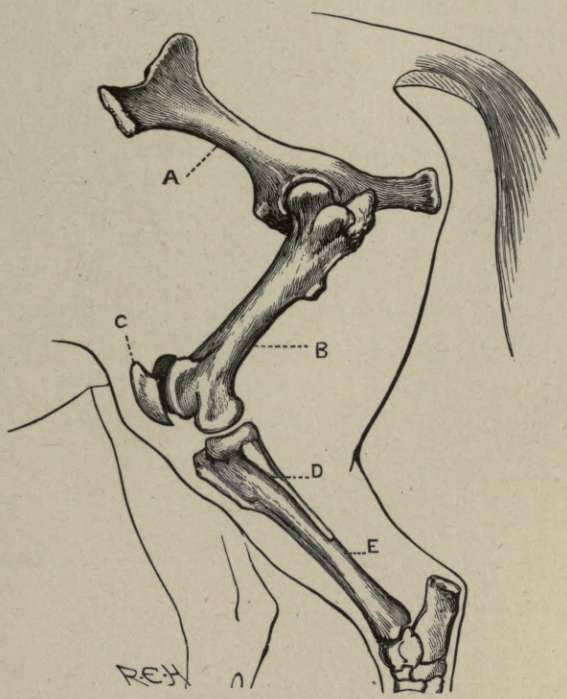


Fig. 378.—The Patella and its relation to the other bones of the Hind Limb

A, Pelvis; B, Femur; C, Patella; D, Fibula; E, Tibia.

Dislocation of this bone in the horse, as in man, is comparatively common, and is most frequently seen in young animals from a few weeks to two years old, although older subjects are by no means exempt from it.

Causes.—The early occurrence of the displacement of this bone in foals, and its persistence, in the absence of any obvious cause, led the late Professor Varnell to attribute such cases to a congenital smallness or want of development of the outer ridge referred to above, which permits the bone in certain movements to be displaced outwardly by the pull of the biceps femoris.

Post-mortem examinations on animals so affected have convinced the writer of the accuracy of this conclusion, and further that, associated with this deficiency of development of the articulation, there is also a corresponding attenuation and weakness of its connecting ligaments, which favours the displacement of the bone.

General weakness is no doubt a cause of luxation of the patella, as evidenced by its frequent occurrence in poor, weakly, overgrown foals, and after such debilitating diseases as influenza and strangles.

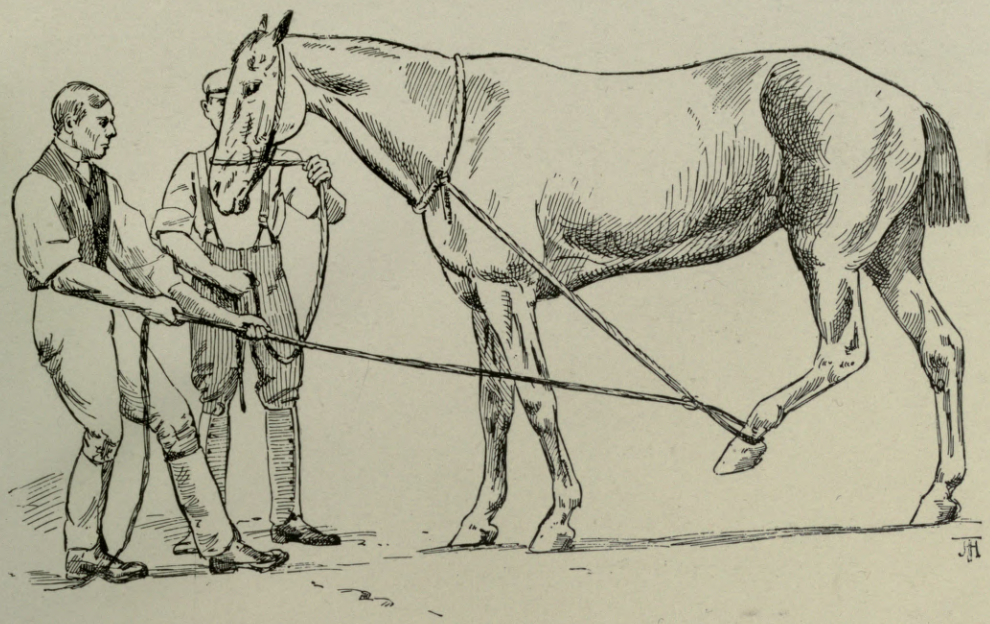
The displacement usually occurs in an upward and outward direction, and although it is impossible to say precisely and fully how this comes to pass, there can be no doubt that it is in great measure determined by the smallness of the outer ridge of the trochlea of the thigh-bone, and the outward pull of the biceps femoris muscle.

As a result of violence, it is seen to follow upon some extraordinary twist of the limb in the act of slipping, jumping, or rearing.

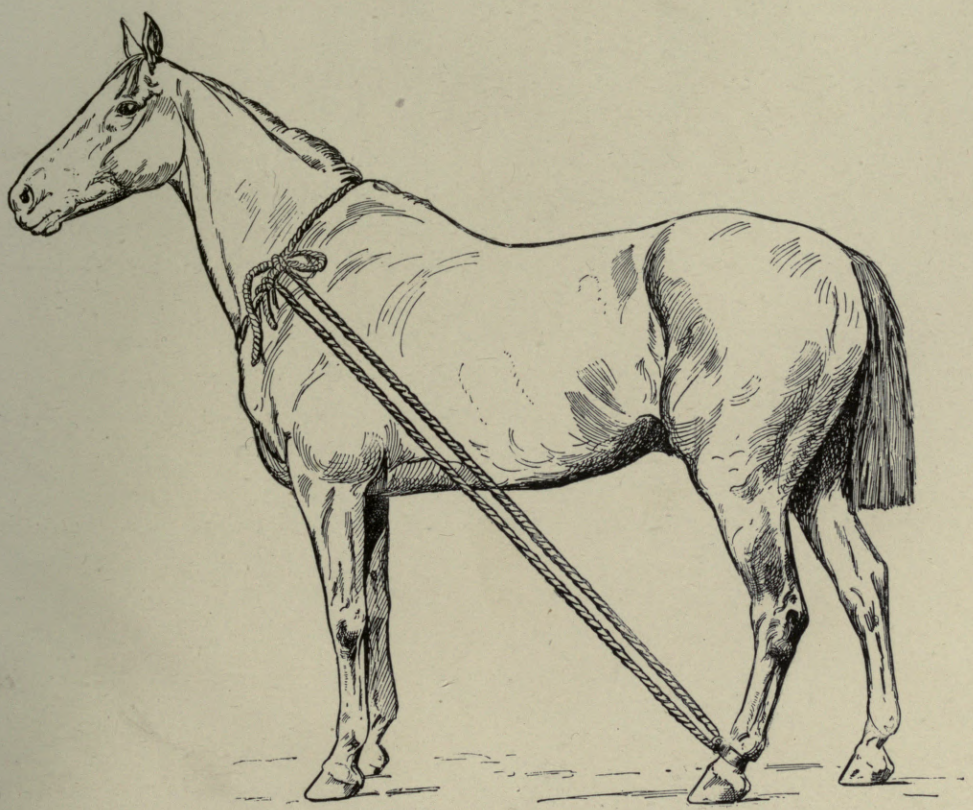
Symptoms.—These will vary somewhat with the nature of the case. When the mishap is the effect of weakness the displacement is usually sudden and transient, coming and going without any apparent reason, and being repeated at varying intervals again and again, each time passing away without assistance. The affected limb is noticed to be suddenly jerked backward and held for a moment in an extended position, and then to resume its place again. This may be confined to one leg, but it is commonly the case that both are more or less affected. Here the displacement is only partial, and although it may be repeated from time to time for some days or weeks, it ultimately passes away without assistance as the animal acquires strength.

In more complete displacement the leg is fully extended backward (fig. 379) and cannot be advanced, and the animal stands in this position helpless and immovable. The displaced bone may be felt on the upper and outer side of the joint.

Treatment.—Replacement of the bone may sometimes be caused to take place by a mere cut of the whip. For the most part, however, it is difficult to effect in cases of forcible displacement. Before attempting to reduce the dislocation the extended limb must be brought forward by means of a rope attached to the pastern, and then passed through a collar



Drawing the Leg forward



The Leg kept in Position

DISLOCATION OF THE PATELLA

or a ring in the manger, or over a beam (Plate XLIII, fig. 1). This having been done, the hand is placed beneath the bone, which is pressed in an upward and forward direction. If the leg at the same time continues to be forcibly advanced, the patella will soon yield to the pressure, and with a sudden click fall into its place.

To keep it there is the next requirement, and for this purpose the leg must be made secure to a collar round the neck (Plate XLIII, fig. 2), and the animal tied up to the rack, or put in slings, and kept perfectly quiet.

Fig. 379.—Dislocation of the Patella

A sharp blister must then be applied over the region of the stifle, and, in addition, it is recommended that a shoe, thicker at the toe than at the heels, and having a projecting piece of iron attached to the former, be put on. So soon as the effects of the blister have passed away, it may be desirable to repeat it before the animal is relieved of restraint.

Where the mishap results from general weakness, or slow growth and development of the parts concerned, a liberal supply of good food is of the first importance, and this should be supplemented by sulphate of iron and nux vomica, given alternately night and morning in the corn.

The patient should be confined to a small shed or loose-box, and blistered over the stifle from time to time, until the displacement ceases to occur.

SPRAIN OF THE BACK SINEWS

The accidental overstretching and rupture of the fibres composing the back sinews is of common occurrence, and is usually designated break-down.

The structure most frequently implicated in this accident is a short ligament (fig. 366), which proceeds from the upper and back part of the canon-bone, and joins the flexor pedis or main tendon of the leg about three inches below the knee. The seat of injury is invariably at the point of union of the two parts.

Horses of the heavy breeds and others engaged on the turf are specially liable to the mishap in consequence of the severity of their work.

Causes.—Horses light of bone, and whose sinews lack size and strength, are more predisposed to this disease than others of stouter build, as are also those with big, heavy frames and small limbs. The exciting causes are heavy draught, slipping and sliding on smooth pavement, and severe efforts in galloping and jumping, particularly under circumstances of fatigue, as at the end of a quickly-run race or steeplechase, when the muscles are tired and the weight of the body is forcibly thrown on the passive structures.

Symptoms.—As a result of this accident an enlargement mostly makes its appearance in the course of the tendons, about three inches below the knee. It is sometimes small and hardly perceptible, while at others it may reach the size of a walnut, or even larger, and extend a considerable distance downwards. When pressed, the horse winces and lifts the leg sharply from the ground. The part, moreover, is hot and inflamed. In standing, the heel of the foot is slightly raised, or the leg may rest on the toe. The amount of lameness will depend upon the severity of the strain. In progression the horse moves short, and imposes the weight mainly on the front part of the foot to relieve the injured part from traction.

Treatment.—In this connection it is important that the injured structure should, as far as possible, be placed in a state of rest. For this purpose the ordinary shoe will require to be removed at once and replaced by one having a thick or wedge heel. Hot fomentations should then be applied for an hour or two, and followed by the continuous use of hot flannel bandages to the leg. A dose of physic and absolute quiet must also be enjoined.

When the inflammation and pain have been in a large measure reduced, hot fomentations may be changed for cold water irrigation and cold linen bandages. It may be that in slight cases these, with a short period of rest,

will suffice; but where the sprain is severe and the enlargement considerable, a blister will afterwards require to be applied to the leg between the knee and the fetlock, and repeated once or oftener according to the progress of the case. It often happens that the shortest way to a cure is to fire the part as soon as the inflammation has dispersed, and blister over the fired surface.

Fig. 380.—Shoe to prevent Contraction of the Back Sinews of the Leg after treatment for Sprain

In bad sprains there is a tendency to contraction and shortening of the injured tendon, resulting in "knuckling over" of the fetlock-joint. To guard against this the wedge-heeled shoe should not be worn too long, but gradually reduced in thickness until the heel is brought to a level bearing with the parts in front. If in spite of this the tendon should contract unduly, a shoe having a short lever projecting from the toe (fig. 380), and a low, thin heel, must be adjusted to the foot and worn for a few weeks. If this fail, then the shortened tendon may require to be cut through in order that the parts displaced may resume their normal position.

WIND-GALLS

These are small, rounded, fluctuating enlargements occurring in the neighbourhood of joints, more especially on the outer and inner aspects of the fetlocks, and also on the hocks and knees (fig. 381). Wind-galls are divided into two classes, according to the part they implicate. In one case they result from a dropsical and unduly distended state of the capsular membrane of the joint with synovia, when they are known as "articular wind-galls". In the other they are due to a similar state of distension of the synovial sheath of a tendon, as in thoroughpin.

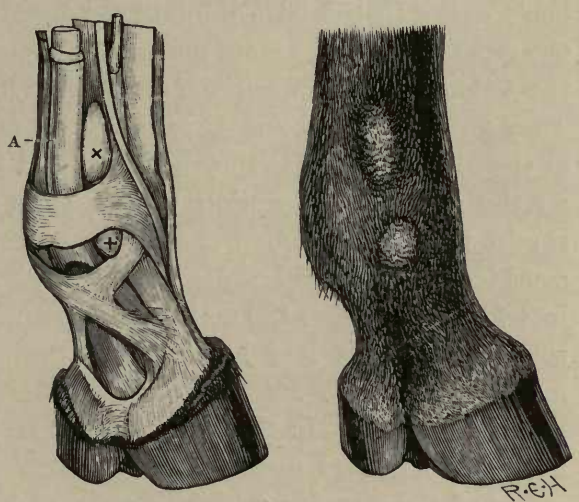


Fig. 381.—Wind-Galls. A, Tendon of the Flexor Perforatus. The swollen bursæ or wind-galls are shown at × ×.

They appear either as isolated swellings or in rows of two or three. To the uninitiated it might appear that each of the wind-galls observed about the fetlock-

joint is a separate and distinct sac. This, however, is not necessarily the case. For the most part they result from a distended state of the synovial sheath that invests the flexor tendons from a point just above the fetlock to the foot. That the swelling is not observed along the entire length of the sheath results from the fact that at certain points it is tightly bound down by strong ligaments, while the intervening spaces where the bulging takes place offer only slight resistance to its outward pressure; all the same, there is a general over-fulness of the sheath from one end to the other.

Causes.—Wind-galls, like the kindred ailment thoroughpin, are unquestionably hereditary. Besides this predisposing influence, it is also observed that horses of lymphatic temperament, *i.e.* such as have a thick skin, coarse hair, fleshy legs, exhibit a special liability to the disease, as do also animals with heavy fleshy bodies and small limbs.

The exciting causes are long-continued severe work, which is especially operative in the case of young immature animals and such as are indifferently nourished. Repeated sprain to the tendinous sheath from heavy draught, slipping, and other forms of violent exertion very largely conduce to bring about the disease.

They are also a result of long standing in a confined space in the course of protracted illness, such as influenza, pneumonia, pleurisy, and rheumatism.

Symptoms.—Wind-galls are readily identified as small boggy swellings in the vicinity of joints, varying in size from a hazel-nut to a small hen's egg. In the fetlock-joints they occur on the inner and outer side at the same time. The more material enlargements appear behind and above the fetlock-joint between the suspensory ligaments and the flexor tendons. They usually come by slow growth, and are at first soft and yielding, but as they increase in size they get hard and tense, especially when the foot is on the ground. Excepting when associated with rheumatism or sudden sprain they seldom give rise to acute lameness, and it is only when of considerable size, and the mechanical play of the tendons and joint are interfered with, that the action becomes materially disturbed. At this time there is more or less heat in the part, and digital pressure occasions marked pain.

Treatment.—In this connection it may be said that the best and most lasting results are obtained when treatment is resorted to in the early stages of the disorder, while the walls of the joint capsule or tendon-sheath are still free from serious structural change. When by protracted irritation and neglect they have become thickened and callous it is hopeless to think of bringing the membrane back to a normal state, although further advance of the disorder may in some measure be kept in check.

Whether the disease results from undue wear or inherent weakness of the parts, withdrawal from work is the first step to be observed. What should follow will depend upon the stage and duration of the malady. If it is of but recent occurrence, a mercurial charge of pitch-plaster applied to the legs from the middle of the canon to the coronet, and a few weeks at grass, may be all that is necessary. In more advanced cases, a course of massage, cold-water irrigation, and tight bandages put on wet is to be followed by a repetition of iodine-blisters at intervals of a fortnight during six or eight weeks' rest. Before adjusting bandages in these cases, it is an advantage to roll up pieces of tow into fairly firm pads and bind them on the wind-galls. By adopting this course pressure is ensured on the spot where it is most needed, and absorption is promoted. In the more aggravated cases, where, in addition to distension of the capsule of the joint or tendon, there is also considerable thickening of the sac, deep firing and blistering will require to be resorted to, and further benefit may result if iodide of potassium be given daily in two- or three-dram doses. In the more extreme cases, involving the tendon-sheath only, it may be necessary to remove the fluid by means of the aspirator, and inject into the cavity a solution of iodine to prevent further filling of the sac.

Fig. 382.—Thoroughpin

THOROUGHPIN

A thoroughpin is recognized as a fluctuating enlargement situated above and behind the hock-joint, between the tendo-Achilles or "ham-strings" and the lower part of the leg-bone (fig. 382). The swelling is more or less rounded or ovoid in form, and goes through from one side to the other, hence the term "thoroughpin". The enlargement consists of a distension of the synovial sheath of the flexor pedis tendon with fluid, and is of the same nature as those smaller swellings which appear on and about the fetlock-joints, termed "Wind-galls". The liability to this disease is especially marked in heavy draught-horses, and particularly when in early life they are forced by high living and idleness to rapid accumulation of flesh for show purposes.

Causes.—As in bog-spavin, so in thoroughpin, the predisposition to it is unquestionably hereditary, so much so in some instances that the writer

has known it to appear in every animal bred by certain mares, and in many of the produce of certain affected sires. Horses with straight, weak hocks, short at the point, are its most common victims.

The inducing causes are excessive feeding, and the too early and severe working of ill-conditioned colts. It is often contracted by yearlings at play, and by older animals from severe sprains otherwise induced. Hard work on slippery ground is a common cause of thoroughpin in its more chronic and progressive form. It is frequently associated with bog-spavin, of the nature of which it very much partakes.

Symptoms.—The enlargement which constitutes the special feature of thoroughpin may develop in a few hours to a considerable size. This is especially the case in young animals, and in older ones also where it arises out of severe sprain. Other cases are less sudden in their appearance, and gradually increase in size through a long period of time. In the former case pain and lameness is usually sudden and severe, the swelling hot and tense, like a forcibly distended bladder, and there may be more or less general filling of the joint. The enlargement is sometimes much more considerable on one side than the other, at others it is uniform on the two aspects. In action the limb is moved stiffly with an inclination outward. At rest it is maintained in a flexed condition, the weight being imposed on the sound leg. Where the disease comes on gradually lameness may for a time be altogether absent, owing to the accommodation which by growth and expansion the tendon-sheath is enabled to afford the slowly-increasing fluid. The time, however, comes sooner or later when the sheath is unduly and suddenly stretched, and pain and lameness result in consequence. In old chronic cases of this kind the tendon-sheath becomes very much thickened, and sometimes by undergoing calcareous degeneration is converted into a hard bone-like substance. It sometimes occurs that an enlargement similar to the one described presents itself on both sides of the hock as a result of bog-spavin. Where this is the case a similar fullness will mostly be observed in front over the seat of the last-named disease.

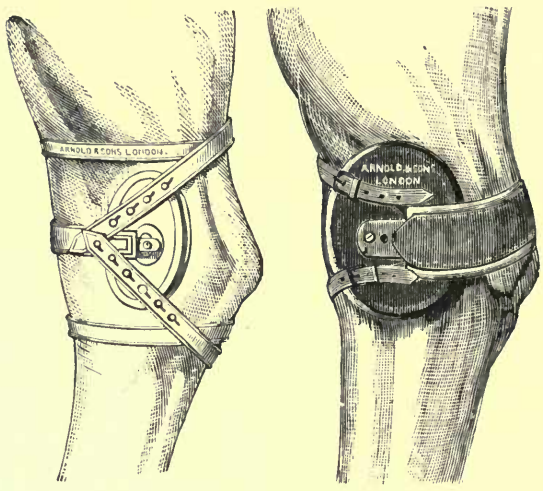


Fig. 383.—Compresses for Thoroughpin

Treatment.—The line of treatment to be adopted will depend entirely on the way in which the disease presents itself. If the enlargement is sudden in its appearance, and attended with inflammation of the structures involved, the patient must be put to rest and subjected to the same treatment as that prescribed under similar circumstances for bog-spavin.

In chronic cases firing and blistering will be resorted to at once, after which pressure applied by means of a suitable compress (fig. 383) may further reduce the enlargement. In some instances it may be desirable to open the sac, and after letting out its contents inject it with tincture of iodine or some other irritant. This, however, is a procedure that can only be safely decided upon and undertaken by the experienced practitioner.

CAPPED ELBOW

When a rounded swelling occurs on the point of the elbow, the part is said to be "capped". Sometimes the enlargement is solid throughout, at others it consists of a sac containing a straw-coloured or blood-stained fluid.

Fig. 384.—Capped Elbow

Causes.—Capped elbow (fig. 384) is the result of injury inflicted by the inner heel of the shoe, either in the act of lying down or while being down, or as a result of slipping while attempting to rise. In these cases the foot has been allowed to grow too long, or the heel of the shoe is unduly extended backwards so as to strike or irritate the elbow.

Symptoms.—The swelling may appear in a few hours, or it may be of slow growth. If the injury is severe the tumour develops rapidly, and is besides hot and tender and mostly fluctuating to the touch, like a cavity filled with fluid. If, on the other hand, the elbow suffers only slight but repeated irritation by contact with the shoe, the growth is slow to develop. At first it is somewhat soft, but as it increases in size it becomes hard and solid, and exhibits but little pain or tenderness unless, as frequently happens, it is contused, when it may inflame and develop an abscess. In some instances these excrescences are allowed to reach a considerable size

amounting to several pounds in weight. Capped elbow seldom causes lameness, but it is very unsightly.

Treatment.—Where the injury is but slight, a dose of physic and repeated fomentation of the part will be all that is needed to disperse the swelling; but where it is severe and the enlargement considerable, it will most likely require to be laid freely open and the contained fluid evacuated. This should be followed by the injection of a small quantity of tincture of iodine into the sac, and the repeated daily application of weak carbolic solution and due regard to cleanliness. If the tumour is hard and callous, it should undergo a course of blistering or be dissected out; or if hanging by a narrow neck, it must be cut off, with due precautions against hæmorrhage or bleeding. Horses which habitually injure the elbow should wear an elbow-pad (fig. 385) round the pastern, or a bandage may be wound round the foot when they are in the stable and at liberty to lie down.

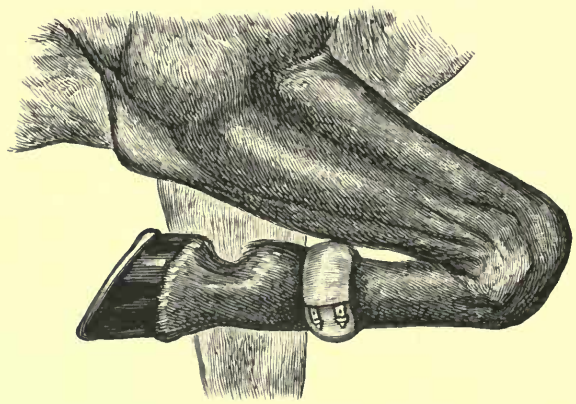


Fig. 385.—Pad to prevent Capped Elbow.

CAPPED KNEE

This condition is analogous to that already described as capped elbow. It consists of a prominent—sometimes pendulous—enlargement, the result of an inflamed and swollen state of the skin and subcutaneous connective tissue. It differs, however, from the last-named affection in the less frequent formation of matter within it and a greater disposition to become hard and callous. It is more commonly seen in cart-horses than in the lighter breeds, and in cattle the growth often attains to an immense size.

Causes.—Capped knee is invariably the result of violence applied to the part, mostly following upon a fall or repetition of falls, when the skin and parts beneath become contused and swollen. In some horses it results from a habit of falling on the knee in the act of lying down, while others contract it by striking the manger or the log at the end of the halter in the act of pawing. Kicks and blows may also induce it.

Symptoms.—In some cases capped knee is of slow growth, especially where the part continues to receive a succession of slight contusions, as in

some of the causes referred to above. When this is so, the enlargement usually presents the appearance and character of a solid organized tumour, resulting from the repeated irritation to which it has been exposed. When it originates suddenly from a severe blow, it may assume the form of a cyst and contain a quantity of yellow or blood-stained fluid, or should the injury be sufficiently severe to excite acute inflammation in the skin and underlying tissue an abscess may result.

Symptoms.—From what has been said, it will be understood that the swelling constituting "capped knee" is a disease of the skin and subcutaneous tissue, and has no reference whatever to another form of enlargement in front of the joint resulting from a distension of the sheath of the extensor tendon of the metacarpus. In the disease in question the swelling when of slow growth is hard and callous; when of more rapid formation it assumes the form of a fluctuating swelling which may or may not be attended with pain. In all cases where an abscess develops, the part is hot and painful, and in a less degree pain is manifested for a while where the tissues become infiltrated with blood-stained fluid only. The latter condition may assume a chronic form and continue long after all soreness has subsided.

Treatment.—Where indications of chronic enlargement of the knee appear as a result of bruising in the act of lying down, the horse should be placed in a loose-box and be provided with a thick bed of peat-moss. This alone in such cases is sufficient to put an end to the trouble. Where, however, the growth has become considerable and undergone organization, its complete removal is impossible save by a surgical operation. Some reduction, however, may be effected in it by a course of blistering, and its further development will be prevented by protecting the animal from a repetition of the injury that brought it on.

If the enlargement is found to contain a watery fluid, the contents must be drawn off by the aspirator and a little tincture of iodine injected into the sac. This having been done, a bandage should be tightly bound round the knee in order to prevent its refilling, and at the same time to induce the disconnected skin to unite again to the parts beneath. For this purpose the horse should be kept tied to the rack or placed in slings and prevented from lying down.

Where the swelling is hot and painful, and there is reason to suspect the existence of an abscess, hot fomentations should be applied to the part, and so soon as any indications of "pointing" appear it should be freely opened with the knife and free vent given to the contained "matter". The sac should then be well syringed out with carbolic solution or some equally efficient disinfectant, and the wound treated on the antiseptic

system. At the same time it is to be observed that the displaced skin of the knee forming the wall of the abscess must be bound down by means of a bandage, as previously suggested, and the horse kept in the standing posture.

CAPPED HOCK

When an enlargement appears on the point of the hock, the part is said to be "capped" (fig. 386). There are two conditions to which this term is applied—one involving the skin and tissue beneath it, and the other the synovial membrane interposed between the bone (calcis) and the tendon passing over it.

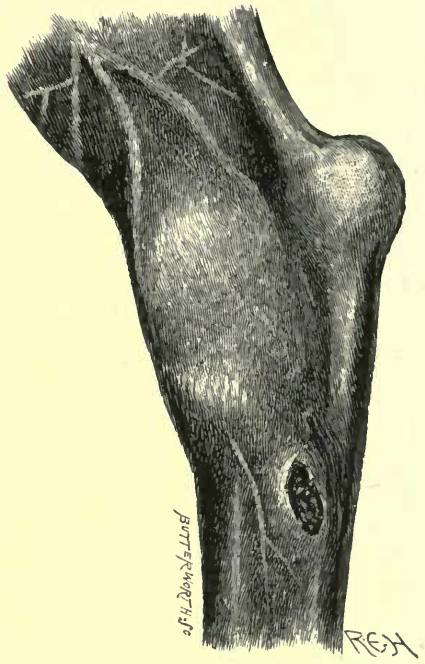


Fig. 386.—Capped Hock

A short description of the anatomy of this part will render this difference intelligible. The point of the hock comprises a bony prominence, over which is spread an expanded portion of the tendon of the gastrocnemius internus muscle, and in order that the latter may more freely move over the former, a synovial sac is interposed between the two and supplies the necessary fluid to lubricate the apposed surfaces. On the posterior aspect of the tendon there is a considerable quantity of cellular tissue, which by its looseness enables the skin to move freely over the point of the hock, and thus to accommodate itself to the extremes of flexion and extension during progression.

Injury to this cellular structure results in inflammation (cellulitis) and swelling, which, when attended with an accumulation of fluid in the part, constitutes a serous abscess.

The other form of the disease is always one of distension of the synovial sac with synovial secretion; but inasmuch as it does not concern the summit of the hock, but only appears at the sides, the term "capped hock" ought never to have been applied to it.

Causes.—Whether the enlargement be of one description or the other, it is invariably the result of external violence. The most common cause is injury done to the point of the hock in lying down on a badly littered floor, or by slipping and striking the part in the act of rising. Pitching on the

hocks when falling backwards in rearing is sometimes the cause, and in many cases it is referable to kicking. The slighter cases of this disease result from rubbing the points of the hocks repeatedly against the wall or stall-posts while rubbing the tail.

Symptoms.—Of the two forms of the malady, that arising out of injury to the subcutaneous cellular tissue is by far the more common, and, it may also be said, the less important.

Capped hocks usually appear suddenly. The size and nature of the swelling will vary with the manner of its production. Where it is excited by repeated rubbing the growth is small at first, and gradually increases in size so long as the cause continues in operation. Blows inflicted in any of the several ways indicated above are followed by sudden swelling, which will be proportionate to the injury. Sometimes it is very considerable, hot and painful to the touch. In consistence it may be firm or tense and fluctuating like an inflated bladder. The latter conditions indicate the presence of fluid beneath the skin, which mostly consists of blood-stained serum (serous abscess).

It is very seldom that lameness results from this form of the disease, although it sometimes occasions slight stiffness for a few strides when recently produced.

The second and exceptional form of the disease is readily distinguished from the first by the fact of the enlargement appearing at the sides of the point of the hock and not on the point itself. It is, moreover, always in the nature of a fluctuating swelling, and, as a rule, inconsiderable in size. It not infrequently gives rise to lameness, and when complicated with disease of the bone is troublesome and serious.

Treatment.—Slight cases of true capped hock do not require much treatment. Cold-water irrigation and cold sponging for a few days, coupled with removal of the cause, and, later, a little hand rubbing daily with gentle pressure, will suffice. Where, however, the swelling is considerable and the hock much inflamed, a dose of physic should be administered at once, and hot fomentations applied freely to the injured part; with the decline of the inflammation, cold-water irrigation may be substituted for hot fomentation. Daily exercise or light work will be beneficial rather than otherwise when the tenderness has disappeared, and a little gentle hand rubbing with pressure may aid in removing the swelling. Where the enlargement proves obstinate a mild blister may be applied and repeated if necessary. It frequently happens in the more severe cases that a permanent and unsightly enlargement remains after all has been done; but there is a tendency to diminish in size as time goes on, so long as no further injury is permitted to be inflicted. Where the enlargement assumes

the form of a serous abscess of considerable size, the fluid may be removed by means of an aspirator or by subcutaneous puncture.

FILLED LEGS—ŒDEMA

Œdema is a state of disease in which the tissues of a part become infiltrated or saturated with the watery constituents of the blood, causing more or less swelling of a soft, doughy character. It frequently occurs in the legs of horses, when they are said to "fill". This form of swelling, although sometimes considerable, is rarely attended with pain, and for the most part is soon dispersed, although liable to recur so long as the cause continues in existence.

Causes.—Filling of the legs is brought about by many and various influences, but of these general weakness and want of condition are by far the most common. Hence it is noticed in animals after an attack of sickness, and especially if attended with long standing and want of rest, as in pneumonia, pleurisy, and some other disorders and accidents.

Heart-disease, by enfeebling the circulation, invariably gives rise to more or less swelling of the limbs, as do also occasionally functional derangements of the liver, the results of over-feeding and idleness. And the same may be said of functional and structural impairment of the kidneys, tending to the suppression of urine. Horses when first stabled after a run at grass are peculiarly liable to œdema, and it is very commonly associated with certain forms of influenza and fever. Horses which inherit a disposition to inflammatory œdema, or, as it is called, "Monday morning disease", are commonly the subjects of these less serious attacks of "filling of the legs". Severe work over hard ground also provokes it in hunters and racers.

Symptoms.—Ordinary filling of the legs presents itself as an enlargement between the pasterns and the knees in front, and the hocks behind. To the feeling, the swelling is doughy and "pits on pressure", *i.e.* a pit is left wherever the pressure of the fingers is applied. There is no considerable rise of temperature or pain in the part, and beyond slight stiffness the action is not interfered with.

The hind-legs, being farthest from the centre of circulation, are more subject to œdema than the fore ones, but it commonly occurs that all the extremities are more or less affected.

Treatment.—In a disease having its origin in so many and such diverse causes, it would be impossible to lay down any single course of treatment capable of meeting all its requirements. In those cases resulting from debility the aim and object should be to build up the system by a

liberal diet, and impart tone to the body by the administration of vegetable and mineral tonics, of which nux vomica and sulphate of iron are the most appropriate. Gentle exercise daily will tend to disperse the swelling, and the liberty of a loose-box will greatly assist in preventing its return.

When œdema is the result of heart-disease there is little to be done calculated to effect any permanent good: regular and careful dieting, light work, an occasional aperient dose of aloes, and such measures as will improve the general health are best calculated to disperse and, as far as can be, control the swelling. Sudden and severe exertion and fatigue aggravate the mischief, and should therefore be carefully guarded against.

When the fault is traceable to derangement of the liver or digestive organs, a dose of physic, followed by a restricted diet and a course of alterative medicine, will suffice to restore the balance again. All cases of œdema are benefited by small repeated doses of nitrate of potash, and more especially so when the disorder arises out of the faulty action of the kidneys. Massage and vigorous rubbing, with the application of dry linen bandages to the legs, will prove serviceable. In some cases wet bandages and cold-water irrigation with exercise will have the desired effect when aided by a short course of diuretic medicine. This treatment is specially applicable to animals whose legs are weakened by hard wear.

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19. DISEASES OF THE FEET

SAND CRACK

This term is used to denote a fissure or rent in the crust or wall of the hoof. Usually the crack extends from above downward or from below upward, in the direction of the horn fibres. It may appear in any part of the hoof, but there are certain positions specially liable to it. In the draught-horse it is most commonly seen in front of the hind-feet, while in light horses it chiefly arises in the inner quarter of the fore-feet. The reasons for this difference may possibly be found in the fact that in the former the front of the foot is subjected to considerable strain in heavy draught, while the inner and weaker quarter of the light horse is most exposed to concussion.

Causes.—The predisposing conditions to sand crack are found in the two opposite states of inordinate thickness and density, and thinness and laxity of hoof-horn. Horses with strong upright feet are specially liable to this disease, as are also animals whose feet are flat and weak, with horn of

coarse texture. When these conditions are associated with undue dryness, as occurs in the heat of summer, and in horses whose feet are in a chronic febrile condition, the liability to crack is much increased. The exciting causes are concussion and strain to the feet under draught or on slippery ground. It may also be induced by treads over the coronet.

Horses with high action in front suffer more than others of less showy gait, and especially when overladen with flesh and indulged in too much rest and standing.

Symptoms.—Cracks usually commence at the coronet, and extend downward. When slight they are frequently covered with overhanging hair, and for a time evade detection. If the animal be continued in work, they increase in length and depth day by day, and extend through the crust to the quick. In this condition the lameness—at first only slight—becomes severe, owing to the sensitive structures being torn and pinched between the edges of the fissure. Blood may ooze from the line of the crack, and if neglected, fungous growth (proud flesh) sprouts out, and with it an offensive discharge of pus or "matter". Lameness in this disease is always present where the rent reaches the sensitive parts. It is aggravated by fast movement, and when ascending or descending a hill. In those cases where cracks are superficial, they may continue and grow out without causing inconvenience.

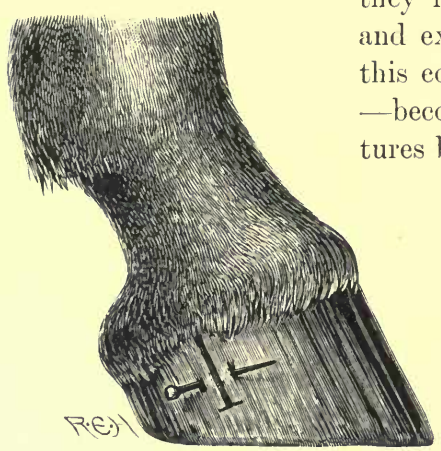


Fig. 387.—Sand Crack

Treatment.—For the radical treatment of sand crack the horse should be thrown out of work, the edges of the crack pared away from top to bottom, and the sensitive parts thoroughly cleansed and dressed with antiseptic solution. With a view to prevent the fissure extending downward, a groove should be burnt into the hoof across the line of the crack below. This may be done with an ordinary firing iron. All that is now required is to protect the wound from dirt by cotton-wool secured by means of tape, and to dress it repeatedly with a solution of carbolic acid. The growth of horn should be stimulated by the application of a mild blister over the coronet, and this may be repeated twice or thrice at intervals of ten days if necessary.

Where it is desired to continue the horse in work, various expedients are resorted to for keeping the edges of the crack together and preventing movement. This may be effected by drilling one or more holes through the

edge of the crack on both sides, and driving fine nails or pieces of wire through them, and clinching them at both ends (fig. 387). A more effective means of doing this is the Vachette clamp (fig. 388), but to insert it a special set of instruments is required, comprising a cautery iron and

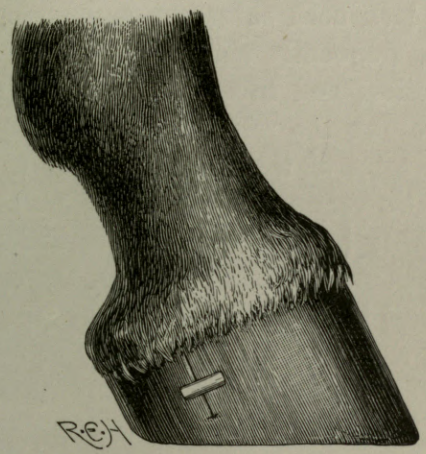


Fig. 388.—Sand Crack Clamped

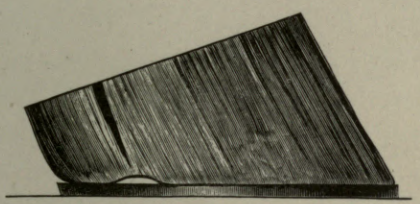


Fig. 390.—Sand Crack, showing method of paring the crust.

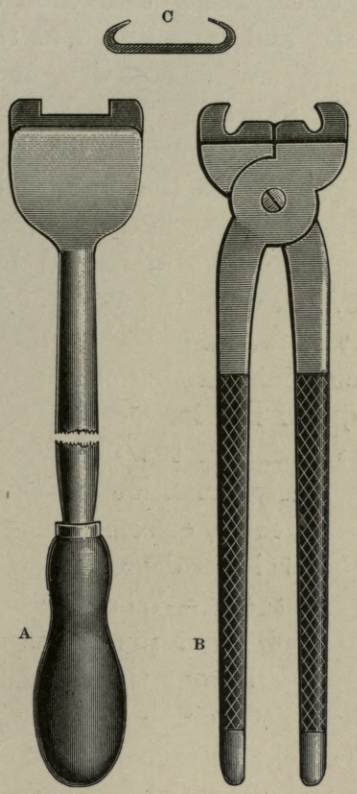


Fig. 389.—Tools for Clamping Sand Crack

A, Iron; B, Forceps for turning-in the ends of the clamp C.

forceps (fig. 389). A piece of tape tightly bound round the hoof will sometimes suffice to keep the parts together where the work is not heavy. In all cases of this disorder the crust immediately under the crack should be pared away sufficiently to prevent any bearing at this point on the shoe (fig. 390). In quarter cracks a bar shoe should be substituted for the ordinary one.

SHELLY FEET

Although not a disease, shelly feet mark the existence of a serious defect in the secreting properties of the horn-producing structures of the foot. Large numbers of otherwise valuable animals are rendered troublesome and sometimes practically worthless in consequence of a want of

adequate protection and indifferent quality of the horn composing the hoof; the coarseness and brittleness of its fibres and looseness of its texture rendering it apt to break away on the slightest provocation, and to afford the shoe a most insecure attachment to the foot. Shelly feet are necessarily weak feet. The crust in these cases is usually thin, the heels are low, the feet flat and spreading, and the soles lack both substance and strength. They are besides hot, dry, and brittle, frequently marked by ridges and furrows, indicating irregularity in secretion, and in consequence of these conditions the crust readily breaks away as the result of "nailing".

Causes.—In the great majority of cases of this kind, heredity is the chief predisposing factor. Some horses at a very early age, and before being stabled, manifest a decided brittleness of hoof-horn, which is seriously aggravated when the forces of domestication come into play. Of these, the undue allowance of highly stimulating food in the absence of adequate work is a common exciting cause; as is also excessive burning in the fitting of shoes, and the impairment of the circulation of the foot resulting from undue paring of the frog and its removal from the ground.

A shelly condition of the foot sometimes dates from an attack of influenza, fever, or some other febrile ailment, and it invariably follows in a higher or lower degree on all attacks of fever in the feet (laminitis).

Treatment.—Where this condition exists, the most salutary effect may be obtained from a run at grass in a damp meadow and a course of stimulating applications to the coronets. If the weather is dry and the pastures parched, little or no benefit will result from turning out in the daytime. In these circumstances a run in a wet yard by day and in the pasture by night will afford the best results. As an application to the hoof, glycerine, worked up with a little fish-oil and tar, will be found useful while the animal is in the stable. In shoeing, as little heat as possible should be applied to the crust, and the frog should be allowed to grow and come to the ground. Beans, maize, and barley are undesirable additions to the food where a tendency exists to brittleness of the hoofs.

SEEDY TOE

The crust or wall of the hoof is composed of two layers: an outer one made up of closely-packed horn fibres, and an inner one composed of horny laminæ. In a normal condition these parts blend with each other in close union, forming one solid, continuous whole.

In the condition known as seedy toe, the horn uniting them undergoes decay and breaks up into a blackish-gray granular-looking debris, which, when removed, leaves behind a space or gap between them.

Although termed seedy toe, the disease is not confined to the part indicated, but is frequently found to exist in the quarters, and sometimes to extend round the hoof from one part to the other.

In its more limited form it presents a superficial hollow in the toe, but it may extend upward to any height towards the coronet. It is not confined to any particular description of hoof. Horses with strong feet as well as others whose feet are weak are alike affected by it. An attack of laminitis imparts a special predisposition to it.

Lameness may not exist until the disease has made considerable advance, and it is in consequence frequently found when not suspected.

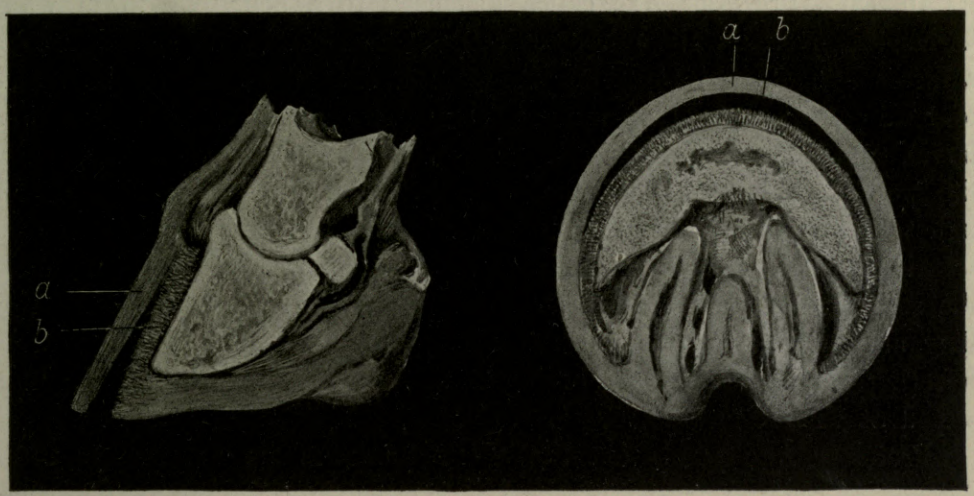


Fig. 391.—Seedy Toe. Vertical and transverse sections of foot, showing the horn fibres (*a*) separated from the horn laminæ (*b*).

Save in exceptional cases, it is amenable to treatment, although frequently demanding a long period of rest.

Causes.—Various causes have been assigned for this morbid condition of the hoof horn. By some it has been referred to injury done by the clip of the shoe. By others to "long-continued strain on the feet which was not sufficient to produce actual laminitis", and to the "weight-bearing surface of the foot being limited to the wall by bad shoeing"; while others again regard it as the result of the repeated application of excessive heat in the fitting of the shoe. Injury inflicted upon the horn-secreting structures of the crust by blows applied to the coronet has also been thought by some to be a sufficient cause. This, however, has been objected to on account of the disintegrated horn never being found at the coronet, or in any part of the crust, excepting when associated with a hole in the toe, from which it has been concluded that the disease commences below and extends upwards. It appears to us that no ex-

planation of the origin of seedy toe will suffice which does not embrace and answer this objection.

In this connection we are of opinion that the foundation of seedy toe is sometimes, if not always, laid by an injury to the coronet, provoking the secretion of a loose and defective horn, and that the seedy or disintegrated condition in which it is found does not follow until this part of the crust has grown down to the ground and the degraded horn has become exposed to dirt and moisture. Under the influence of the latter it breaks up into the small seed-like particles from which its name has been derived.

In 1884 Professor Axe called attention to a nematode worm which he had discovered while microscopically examining the horny debris from a diseased hoof. In reporting the case in the *Veterinarian* he speaks of finding "thousands of minute, elongated parasites, with their ova, larvæ, and structural remains". The late Professor Cobbold recognized the possible importance of the find, and from his knowledge of the structure and the habits of kindred parasites he had no hesitation in assuring Professor Axe "of their capability to permeate and break down the structure of the hoof in the manner observed in seedy toe". How they are enabled to accomplish this feat of destruction he explained by referring to "a formidable boring-tooth or spike with which they are armed at their oral extremity".

Professor Axe points out that these parasites are not always to be detected in seedy feet; but it seems quite clear, from the numbers in which they existed in the specimen referred to, that they had found an "agreeable nidus for their growth, development, and propagation", and by their presence and peculiar armature must contribute in no small measure to the extension of the disease whenever they gain an entrance to the hoof, which Professor Axe points out they may do in an ordinary way through cracks and old nail holes.

Dr. Cobbold provisionally named the parasite *Pelodera Axei* and described it as follows:—

"Mouth with broad vestibule and horny style; œsophagus long, with a large round bulb below, armed with dental plates; tail in both sexes long, subulate, very finely pointed; male with two short, nearly equal spicules, no bursa; female viviparous.

"*Habitat.*—Hoof of the horse (*Equus caballus*).

"*Measurements.*—Males $\frac{1}{30}$ of an inch long, females $\frac{1}{25}$ inch; breadth of the male $\frac{1}{650}$ inch, and of the female $\frac{1}{400}$ inch; length of longer spicule $\frac{1}{650}$ inch, of the boring tooth $\frac{1}{1000}$ inch; length of the larvæ from $\frac{1}{200}$ to $\frac{1}{50}$ inch; ovum, with coiled embryo, $\frac{1}{500}$ inch by $\frac{1}{850}$ inch; reproductive

and anal outlet in the male placed $\frac{1}{150}$ of an inch above the point of the tail."

Professor Angelo Baldoni of Bologna says the cause of seedy toe is a mould which he terms *Achorion Kerathophagus*, whose peculiar culture ground is horny tissue.

Treatment.—As in these cases a hole exists in the crust, and there is no possibility of bringing about a reunion of the two layers, the most radical and successful method of procedure is to remove all the outer fibrous layer from the toe upwards to a point where separation ceases. By this means the cavity is done away with, and the accumulation of dirt and moisture, which acts prejudicially upon the horn, is prevented.

Fig. 392.—Pelodera Axei

1. Male. 2. Female. 3. Portion of female containing young. 4. Young female.

It now remains to await the reproduction of the parts removed and the downward growth of a sound hoof.

As a means of expediting this, a little weak ointment of cantharides or the biniodide of mercury may be applied round the coronet, and repeated at intervals of seven to ten days during a run at grass. A light bar shoe, thin at the heels, should be applied to the foot, so that the weight of the body is made to fall backwards and relieve the weak crust in front. Where a pasture is not available, the horse should be made to stand on peat-moss, tan, or saw-dust, and have a wet swab constantly applied to the crust.

Where little or no lameness exists, it is sometimes found desirable to continue the horse in work until a more convenient time arrives for subjecting him to the operation. When this is decided upon, the "seedy" matter should be removed from the crack, and the cavity, after being washed out with a solution of carbolic acid, well packed with tow and a composition of tar and grease.

KERATOMA—HORN TUMOUR

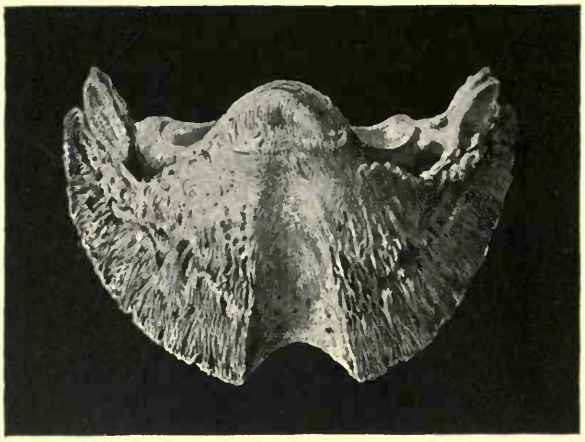


Fig. 393.—Keratoma or Horn Tumour
Notch or groove in the pedal bone resulting from pressure of Keratoma.

A tumour composed of horn sometimes forms on the internal face of the hoof, from which it projects inwards, and by continued pressure imbeds itself in the substance of the pedal or foot bone, some of which it causes to be absorbed. These growths may be elongated, ovoid, or cone-shaped. They mostly occur at the toe, but, rarely, also appear at the coronet, from which they extend downwards towards the lower border of the foot.

Keratoma is produced by an abnormal growth of horn from the laminæ or papillæ of the vascular tissues by which the hoof is secreted.

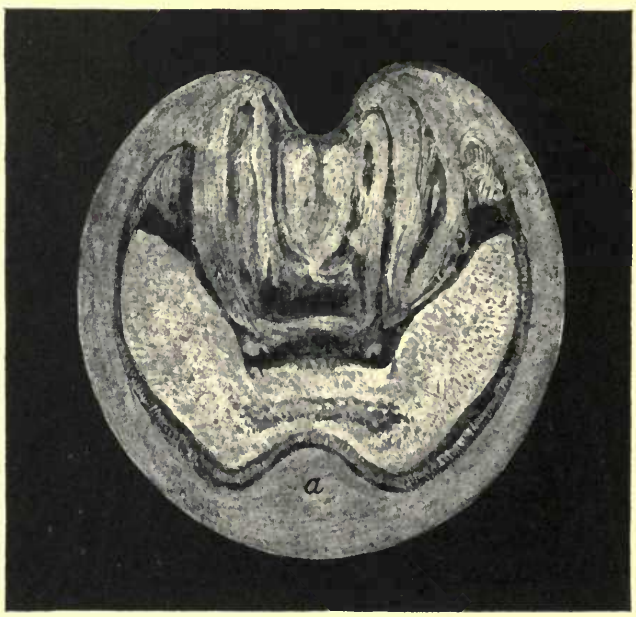


Fig. 394.—Keratoma or Horn Tumour
Transverse section of foot, showing Keratoma (*a*) in situ.

Causes. — These growths have their origin in some injury or irritation of the horn-secreting structures. A blow or tread on the coronet may be the exciting cause, but more commonly it would seem to have some connection with injury done to the toe, which is generally believed to be inflicted by too much force being used in hammering down the toe clip. Injury by a nail driven too near the quick may also be the starting-point, or it may follow a crack in the hoof. However produced, there is evidently a chronic state of congestion excited in the horn-forming structures at the seat of the morbid growth.

The development of these tumours is slow and progressive, and there is reason to believe that but little or no inconvenience or suffering arises during their early formation; but as they become larger they not only press directly upon the sensitive quick, but tend to cramp the whole of the internal parts of the foot, and cause absorption of the pedal-bone. The horse then becomes more or less lame. If the tumour is in front, he inclines the weight of the body towards the heel. There may be a bulging in the horn over the seat of the mischief, but it is just as likely that no outward change may be observed.

Treatment.—But little can be done in these cases short of removing the tumour, and this seldom succeeds in curing the lameness, and frequently aggravates the mishap.

Some relief may be afforded if the shoe be carefully seated out in such a way as to remove the pressure from the seat of the growth. Should the tumour be in front, a bar shoe gradually thinned off towards the heels may be applied to the foot, so as to incline the weight backwards and away from the diseased part.

THRUSH

Thrush consists in a congested condition of the sensitive frog associated with a discharge from the cleft and a ragged state of the horn. It is mostly seen in the fore-feet, although the hind ones now and again give evidence of the disease.

Causes.—The causes of thrush are constitutional and local. In regard to the former the malady is found more especially in animals of a plethoric habit, and especially when too highly fed and allowed to lead a sedentary life. Old animals suffer more frequently from thrush than young ones, not so much on account of age itself as the diseases incidental to it. This refers more especially to navicular disease, during which thrush almost invariably occurs from time to time at longer or shorter intervals. Long standing on hot, decomposing manure, or peat-moss saturated with moisture, is a fruitful cause of the disorder. Bad shoeing, in the course of which the frog is unduly pared and removed from contact with the ground, and allowed to become hard, dry, and shrunken, is perhaps the most common predisposing factor. It often follows a turn out to grass during wet weather.

Wherever it exists it indicates a disordered state of the vascular parts of the foot, and should receive prompt attention.

Symptoms.—The presence of thrush is indicated by an offensive discharge from the cleft of the frog. The matter is grayish-white in colour, and varies in consistence from that of cream to that of soft cheese.

Rarely it is of a dark watery character. In the former condition it is chiefly made up of young horn cells mingled with varying small proportions of pus corpuscles, and occasionally with blood. Usually this disease is unattended with lameness, but in some instances it is very marked, and may be severe. Horses with thrush travel badly on rough roads, owing to the tender frogs being brought into contact with stones.

Treatment.—In all cases of thrush the system of shoeing should receive attention, and strict injunctions be given to the shoeing-smith to bring the frog gradually to the ground and remove no part of it save such portions as are ragged and disconnected with the parts beneath. A dose of physic or a course of saline medicine may be given in the case of plethoric animals, and the work should be increased.

As a means of assisting the discharge and bringing about a healthy state of the parts, astringent applications should be made to the frog, after the cleft has been thoroughly freed from dirt, by careful washing with carbolized water. The dressings most commonly used, and which are most effective for the purpose, are sulphate of copper or alum mixed with tar and a little carbolic acid. A solution of chloride of zinc is also a useful application; the ointment of the red oxide of mercury is equally beneficial. Tar dressing is sometimes applied by means of a pledget of tow, and covered over by a leather sole, and if it is required that the horse should work, this protection is in some instances necessary. Besides protecting the diseased part from injury, it has also the advantage of excluding dirt, but it forbids the removal of the application without the removal of the shoe. This difficulty may, however, be in some measure overcome by the use of movable leather pads.

CORN

Definition.—A corn is a bruise to the sole of the foot occurring at the inner heel, in the angle between the crust and its inflection—the "bar". The almost invariable occurrence of the injury at this point would seem to be due in part to the inner quarter being weaker and more yielding than the outer one, and in part also to its being more immediately under the centre of gravity.

The fore-feet are almost invariably its seat, and of these one or both may be affected.

Causes.—The chief predisposing conditions to corn are the conformation and structure of the feet, and indifferent shoeing. With regard to the former, it may be remarked that flat feet with low, weak heels and thin soles and crust are those most likely to contract the disease. Feet of a strong, upright, and blocky type, although less frequently

affected, are, nevertheless, liable to attack. As to shoeing, excessive paring of the sole, removal of the bars, and undue lowering of the heels, all tend to weaken the part and expose it to injury. Shoes, when made too short and narrow at the heels, if insecurely nailed to the foot, or worn too long, are liable to displacement, and by becoming embedded within the crust occasion a bruise to the sole.

After one or two attacks of corn, predisposition to the malady is very much increased, and some horses are seldom entirely free from it. These chronic cases are chiefly due to a diseased and asperous condition of the heels of the coffin-bone, resulting from former attacks, which irritate or injure the sensitive structures on which they rest.

Symptoms. — The actual existence of a corn is only made known after a portion of horn has been removed from the sole, in the angle between the bar and the crust, when a red spot varying in size from a pea to a sixpence will be found. The quantity of horn necessary to be taken away will depend on the time the corn has been in existence, *i.e.* whether it is an old corn or a recent one. In the former case the discoloration will be near the surface, and readily exposed and quickly "pared out". In the latter it will be deep down, near to the sensitive foot, and a considerable amount of horn may require to be removed before it is brought into view. The farther a corn is away from the surface the more recent it is, and the more likely it is to be a cause of lameness. Sometimes in paring a corn a quantity of dark-looking fluid escapes from between the horny and sensitive sole; it is then said to be a "suppurating" corn. Other symptoms of the disease are heat, especially over the inner quarter, tenderness to pressure, and lameness.

During progression the animal's step is short, and the foot is brought to the ground with the bearing specially on the outer side. In severe examples of suppurating corn the leg sometimes becomes swollen as high as the fetlock, or even the knee, and evinces considerable pain to pressure. In such cases the lameness is frequently referred to the leg, while the corn is altogether overlooked, until attention is directed to the formation of an abscess at the coronet, through which the matter in the foot escapes. This condition is known as a quittor.

Treatment.—A mild dose of physic is a good preliminary to the local treatment of corn. The foot will require to be carefully pared over the seat of injury, and should it be found to contain "matter", free vent must be given to it. The foot should then be put into a pail of warm carbolized water for half an hour, and afterwards transferred to a hot poultice of linseed-meal and bran. Before the poultice is applied, the corn should be dressed with a solution of carbolic acid, and covered

over with a pledget of cotton-wool, so that none of the bran and meal may enter the wound. When the inflammatory action has been subdued, poulticing may cease, and the carbolized dressing may be applied three times a day, with the cotton-wool covering made secure by tapes or cross-sticks, and the foot enclosed in a bag or boot. Later, a blister over the coronet and cold water swabs to the feet, conjoined with rest, will complete the cure.

In mild cases of the disease cold-water irrigation, wet swabs to the feet, and rest on a soft surface are all that is required.

Leather soles and "stopping" should be worn for some time after the lameness has disappeared, and by some animals at all times.

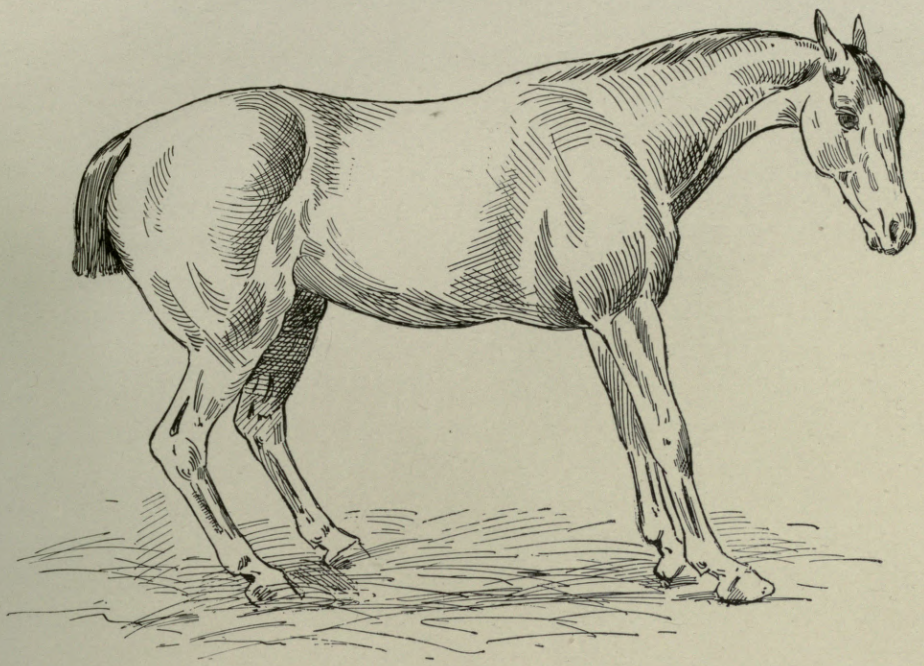
LAMINITIS—FEVER IN THE FEET

Definition.—Laminitis consists of an inflamed condition of the sensitive laminæ, or, more properly, of the entire thickness of the layer of skin which intervenes between the hoof and the pedal or foot bone. In addition, however, to this, the foot bone itself is invariably in a state of general congestion, and in acute and protracted cases undergoes very marked changes of form and structure in consequence. The disease is much more prevalent in the heavier than in the lighter breeds of horses, and among stallions especially during the early period of the season when their services are first called for.

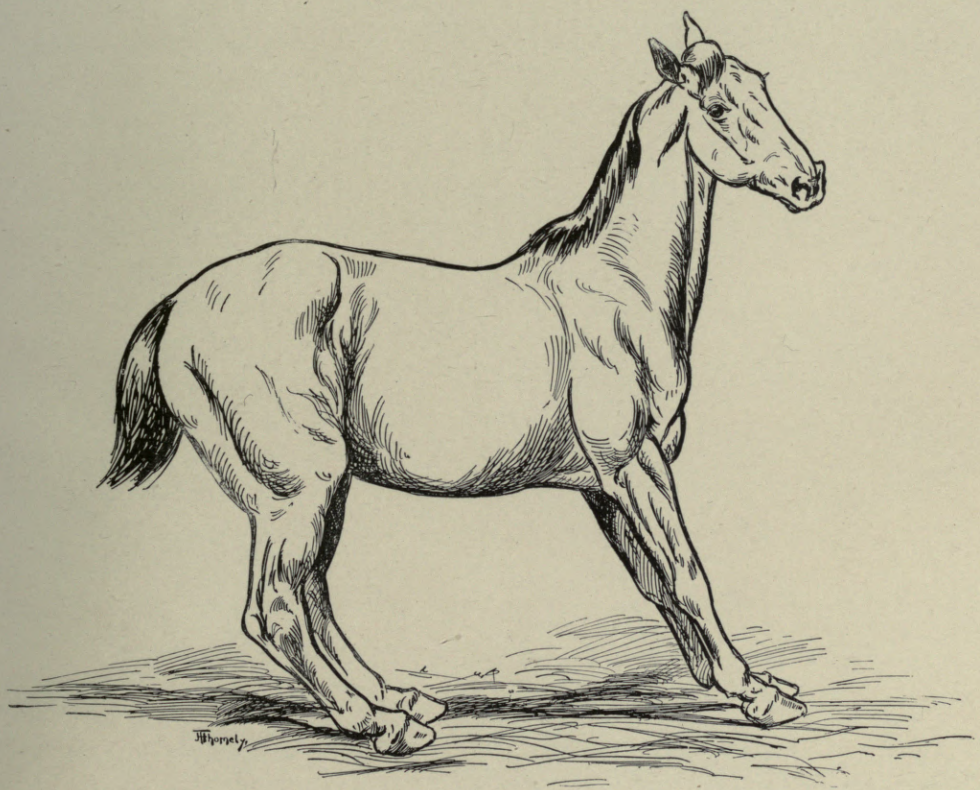
Causes. — By some heredity is regarded as a predisposing factor in the production of the disease, and there is much to be said in favour of this view of its origin. Animals with wide, flat feet, low at the heels, and wanting in hoof-horn, are especially liable to contract it, but none can be said to be altogether exempt from it. The exciting causes are many and various. Among them may be mentioned high feeding during a long period of idleness, the injudicious use of certain kinds of grain, especially barley, beans, and wheat when new. It is also provoked by long and fast driving on hard roads, particularly in horses with high beating action and heavily fleshed.

It frequently follows upon protracted disease of the organs of the chest, which compels the sufferer to stand for long periods without removing the weight from the feet; and, for reasons which cannot be clearly stated, it sometimes comes on after foaling, and less frequently in consequence of the action of a dose of physic. It may also result from exposure to cold and wet after a long and fatiguing journey.

Symptoms.—The onset of laminitis is usually sudden, and little or no warning is given of its oncoming. The fore-limbs are most frequently



Posture in Laminitis of the Fore-feet



Laminitis in Fore- and Hind-feet

LAMINITIS

affected, but sometimes the hind ones are also implicated at the same time. In this disease the posture and gait are very diagnostic. The animal stands in a crouching position, with the fore-feet extended far in advance of him, and the hind-legs are brought forward under the body to sustain the weight of which the fore ones have been relieved. When made to move, the action is short, jerky, and painful, and the weight of the body is thrown on the heels. The feet are hot to the touch at first, and may later become quite cool. If struck with a hammer, however lightly, pain is induced. In severe attacks the suffering is very intense, and constitutional disturbance is evinced by an anxious expression of the face, hurried breathing, a quick hard pulse, heightened temperature, restlessness, and patchy sweats. The mucous membranes of the nose and eyes are of a deep-red hue, the mouth is hot and clammy, and the bowels are constipated. In cases where the hind-feet are also affected it is difficult to induce the animal to move, and he stands fixed to one spot, or falls to the ground, where he remains unable to rise.

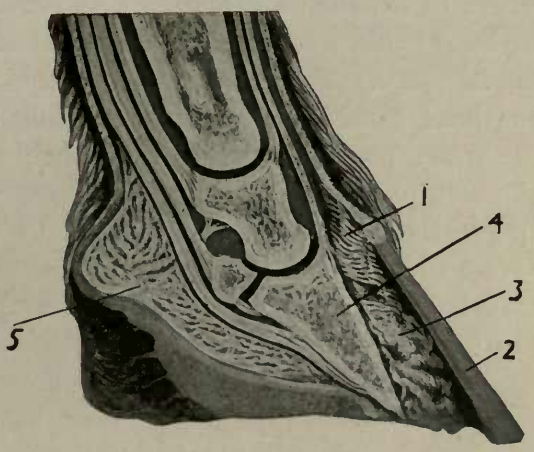


Fig. 395.—Laminitis

1, Coronary cushion. 2, Healthy horn. 3, Cicatricial horn. 4, Os pedis displaced by pressure. 5, Heel displaced by pressure.

Unless relief is speedily afforded, the feet undergo marked changes of a permanent character. The soles "drop", owing to the coffin-bones having become separated from the hoof and displaced, and the front of the foot sinks in, so that while the one becomes convex or unduly prominent, the other becomes concave or depressed (fig. 395). Later, rings appear on the hoof owing to irregularity in the secretion of horn, and the texture of the latter becomes loose and shelly (fig. 396). The toes increase in thickness and become rounded, and have a tendency to turn upward.

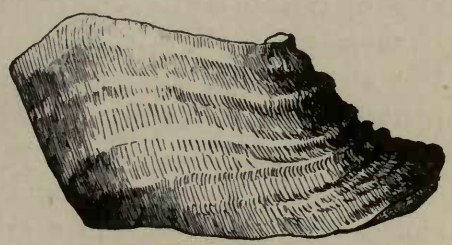


Fig. 396.—Laminitis

Treatment. — In all cases of this affection the bowels should be unloaded as speedily as possible by a full dose of physic, and if the patient is seen at the outset, blood should be taken from the jugular

vein, particularly in the case of plethoric animals. To relieve the feet of the weight of the body and mitigate suffering, the patient may be put into slings and kept there as long as he is able to endure the position. Should he become restless, he may be liberated and allowed to lie down, where he should be encouraged to remain. In either case a good bed is to be provided, comprising a foundation of peat-moss, with a fair covering of straw. The latter will be required to pack the body and protect the head from injury when struggling on the ground.

When practicable, the shoes should be removed without delay, and the feet placed in hot bran poultices, which will require to be renewed frequently, and in no case allowed to become cool. If the pain is very severe and the constitutional disturbance runs high, a full dose of morphia may be injected beneath the skin, and repeated once or oftener according to the requirements of the case.

When substantial relief has been afforded and the inflammatory symptoms subside, poulticing may be discontinued, and the feet freely and repeatedly irrigated with cold water, and as soon as possible the patient may be made to move about the box. If a pond is accessible, he should be led into it and allowed to remain with the affected feet in water for several hours at a time, or, failing this, a deep layer of wet clay may be laid in the stall, where he should be made to stand. Gentle walking exercise on a soft surface of tan or manure should be enforced for short periods two or three times a day, and finally a sharp blister should be applied to the legs, from the coronets as high as the middle of the canon, and repeated once or more at suitable intervals if required. When the soreness has passed away from the blistered surface the patient may be turned into a soft meadow, by preference one adjoining a river. If shoes are applied to the feet, they should be short and moderately thin at the heels, so as to admit of the weight being thrown on to the posterior part of the foot.

Death from laminitis is by no means rare in severe attacks of the disease, and structural changes with or without deformity of the feet almost invariably result in a greater or less degree.

QUITTOR

This is a fistulous wound on any part of the coronet just above the hoof, having one or more openings communicating with each other under the skin by pipes or channels (sinuses), and usually involving the deeper structures at this part.

The **cause** of quittor is an injury to the coronet, such as a tread,

or bruise from other causes; or it may result from a stab from a sharp instrument; or from injury to the sensitive parts of the foot at the sole, as from pricks in shoeing, festering corns, or bruises on the sole, or any other accident, followed by the formation of matter (suppuration) under the horny hoof. It is sometimes induced by frost-bites in the winter, the matter following the inflammation so produced burrowing into the deeper tissues of the coronet.

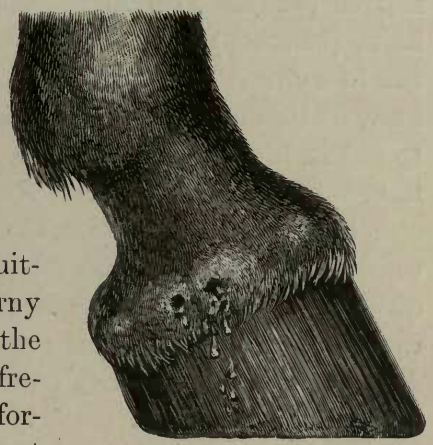


Fig. 397.—Quittor

The parts affected in quittor are the skin and underlying tissue (cutaneous quittor), or it may extend to the ligaments so called (tendinous quittor), or deeper still, to the gristle (cartilaginous quittor), or it may penetrate under the horny foot (sub-horny quittor), and even to the bone itself and the joints. It most frequently attacks the heels and extends forwards to the quarters, and even to the front of the coronet, or it may commence at the latter and extend in a backward direction. Heavy horses are more often affected than the lighter breeds, but this is only because they are more exposed to injuries of the coronet. Moreover, it is generally the inner side of the foot that is affected, probably because corns, which are common causes of the malady, are most frequently found there, and the animal is more likely to tread on the inner side of the foot than on the outer.

The principal **symptom** is a hot and painful swelling on the coronet, usually on the bulb of the heel, where matter forms (abscess), and finally bursts through the skin just above the hoof. If the wound is probed we shall probably find channels (sinuses), running in more than one direction, usually, however, downward behind the coronary band at the top of the hoof; others may pass horizontally round the coronet either in a forward or backward direction. These latter frequently form fresh centres of suppurative inflammation, the skin either just in front of or a little behind the original wound swells, forms matter, and breaks, forming a second wound; and this may go on until there are several wounds on the skin, leading by narrow canals (sinuses) to one another, and so forming a net-work of channels in the tissues of the foot. As may be imagined, this gathering and channelling process is a very painful one, and makes the animal very lame, so much so in some cases that the limb is constantly being lifted from the ground in an uneasy manner. From the wounds a more or less copious purulent discharge flows, which is most

offensive when the gristle or the ligamentous or bony tissues are involved. Under all circumstances the disease is a tedious and slow one when these lowly organized tissues become affected, and the prospects of immediate success cannot be said to be very encouraging.

The **treatment** consists in giving free liberty for the escape of all matter (pus). This is usually effected by opening the sinuses with a knife (bistoury) specially constructed for the purpose. When the sinuses run in a downward direction the horn covering the channels must be rasped away as thin as possible, and then the pipe laid open; but this is far easier to put in black and white than it is actually to put it into practice; nor is it unattended with danger, for one may possibly injure the underlying structures and even open the joint, especially if the sinus is situated towards the front of the foot, and the horse is at all restive, as it frequently is. In these circumstances it is far safer to cast the animal than run any risk of injuring the joint, or of the animal injuring the operator. Another method, and not one to be despised, is to cauterize with a hot iron. Here again we must be careful of the joint. We remember once operating on a horse's hind-foot by this method in the standing position, and although all ordinary precautions were taken, such as placing a twitch on the nose and holding the fore-limb of the same side up, we had no sooner touched the wound with the heated iron than he kicked violently out and unfortunately struck the iron, which penetrated the foot-joint, with the result that he died within two or three days. We relate this unfortunate accident to show how dangerous an ordinary simple operation may be, especially with a restive animal.

Another and safer method is to plug the sinus with caustic, such as corrosive sublimate or arsenic, and after the "core slough" has come out (which takes from four to six days), the wound should be injected with an antiseptic lotion. Or caustic and antiseptic liquids may be injected repeatedly into the wounds. These are often followed by stimulating injections, such as the tincture of iodine. A blister rubbed on the coronet sometimes starts healing action in the wound. The cartilage frequently becomes diseased, rendering the malady a formidable one to treat. In fact, cauterize by what method we may, or inject whatever lotion we may, nothing seems to be of any use. In such a case recourse is had on the Continent to extirpation or cutting away of the cartilage, which is, it is needless to say, a somewhat formidable operation, and altogether beyond the resources of the amateur; even in the hands of the most skilful veterinary surgeon it frequently fails to bring about the desired result.

We may say that all wounds inflicted on the feet of horses are attended with danger and are liable to lead to abiding disease, because it is so very

difficult to keep them clean—*a most essential point with all wounds.* This, together with the class of tissues involved in quittor, and the constant movement going on at this part, renders such cases very unthankful ones to treat even under the most favourable circumstances; and when any inattention or neglect in dressing and cleanliness takes place on the part of the attendant, it makes it almost impossible to effect a cure. Again, animals so affected are usually restive, and the attendant having insufficient or no help, soon gets disheartened at the slow progress his patient makes; for which perhaps there is some excuse. Whatever method of treatment is adopted in these fistulous wounds, we are confident it is quite as important to get an attendant (nurse) who will religiously carry out the instructions given to him by the medical adviser, as it is to select a proper remedy, because there is not a method or a line of treatment that is not at times successful and at other times the opposite.

To **prevent** quittor all injuries to the coronet, however slight, should be placed under treatment at once, and all injuries to the sole of the foot, followed by the formation of pus, should be thoroughly opened to allow the free exit of the matter below, and thus prevent as much as possible the probability of the matter ascending up the wall of the hoof.

CANKER

This is a malignant disease of the feet characterized by the development of a soft, spongy growth on the frog or sole, or both, attended by a thick, offensive discharge of the consistence of soft cheese. It is more common in the heavy than the light breeds, and in the hind than the fore feet. The disorder may be confined to one foot alone, or it may affect two, or all of them may suffer. Pathologically, it is essentially a papilloma or overgrowth of the papillæ of the sensitive foot, and in this respect is allied in its nature to grease, by an extension of which from the leg to the foot it is sometimes produced.

Causes.—The inducing causes are such as provoke irritation in the sensitive foot, hence it commonly follows upon an attack, or more frequently upon a succession of attacks, of "thrush". It may also arise out of various forms of injury to the foot, as corns, pricks, sand crack, and quittor; and, as already remarked, it sometimes results from the downward extension of grease in the heel. By some it is regarded as a specific disease, and this may ultimately prove to be the case.

Symptoms.—A grayish-white offensive discharge, very much like what is seen in thrush, is the first indication of the disease. This is accompanied by a soft, spongy swelling of the sensitive frog or sole, in

the course of which the horny covering becomes broken up into coarse, brush-like fibres, having no disposition to cohere and form sound horn (fig. 398). Later, the horn-producing power of the affected parts becomes enfeebled and ultimately destroyed, and a thick fleshy growth appears, covered with enlarged papillæ and a stinking mass of degraded horn cells (fig. 399). Unless arrested, the disease spreads from the horn-denuded sole to the heels and quarters until the foot becomes stripped of its hoof and greatly disorganized. In the early period of the disease, and even when it is considerably advanced, lameness may be altogether absent or very inconsiderable, and the slow progress of the malady enables horses affected by it to continue in work for some time; but as the foot becomes more and more bereft of its horny covering, pain and lameness increase until the animal, though otherwise healthy, is rendered unworkable and useless.

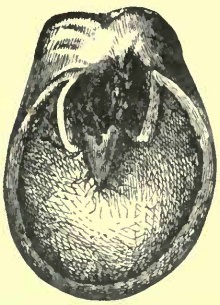


Fig. 398.—Canker

Treatment.—When these cases are promptly taken in hand and judiciously treated, arrest of the disease is possible; but in the great majority of instances the hopeful period is allowed to pass by before anything is done, when it runs its course unchecked. Once fairly established, the prospects of recovery are very remote, and in the most favourable circumstances success can only be looked for after months of treatment and an outlay often exceeding the value of the patient. Where treatment is determined upon, a dose of physic should be given at the outset, followed by a restricted diet. The diseased foot should then be thoroughly cleansed and disinfected by long immersion in a pail of antiseptic solution, the active principle of which may be carbolic acid, perchloride of mercury, or chloride of zinc. This done, all loose horny shreds should be removed, as well as horn underrun by the disease. Where fungous growth is exuberant it should be removed, either by the hot iron lightly applied or by some caustic agent, such as strong solution of chloride of zinc, powdered perchloride of mercury, sulphuric acid, or nitrate of silver. On the top of the caustic application a thick pad of tow should be placed so as to impart pressure to the diseased surface, and when bound on to the foot the whole may be transferred to a suitable "boot", and the dressing renewed at intervals of two or three days for so long as may be necessary. These, however, are not cases in which amateur doctoring is likely to succeed.

Fig. 399.—Canker

They require the services of the most enlightened and painstaking practitioner, who will recognize the changes for good or ill as they occur, and will regulate his treatment accordingly.

CHRONIC VILLITIS

Beneath the hoof-horn extending round the coronet is a prominent band of fibrous tissue called the coronary cushion. Its surface is covered with a large number of closely-packed vascular villi—little projecting bodies which have been likened to the pile on velvet (fig. 400).

Each of these little processes fits into a small hole in the coronary groove of the hoof, and from them the crust is produced and renovated. This being the case, it is most important to the integrity and strength of the crust that the coronary cushion should be in a healthy condition; and so long as it is so, the horn which it forms is ample in quantity, and possesses the normal hardness, toughness, density, and thickness. When, however, inflammatory disease affects the secreting villi and the fibrous cushion, from which they proceed, the horn becomes altered in quality, and, losing the cohesive property by which its fibres are bound together, it becomes dry, loose in texture, and crumbles away. This changed condition is due to two factors—(1) the altered nature of the horn secreted; (2) the separation of the secreting villi from one another by the swelling and expansion of the coronary cushion, whereby the horn fibres are made to stand apart from each other, and fail to form that close compact mass of horn which the crust presents in a healthy condition.

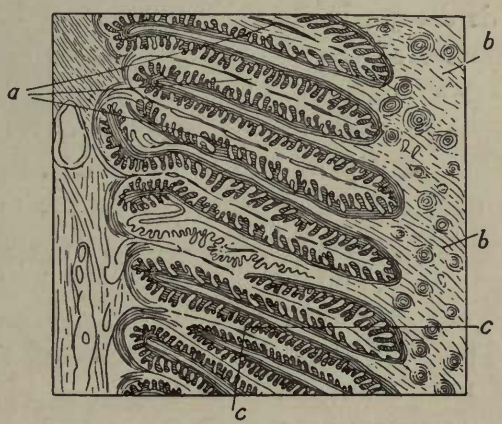


Fig. 400.—Villi of the Coronary Cushion and Growth of Horn

a, Villi of the Coronary Cushion. *b*, *b*, Horn of the hoof, with tubes in transverse section. *c*, Vessels of the villi.

Causes.—Some horses inherit a dry and brittle state of the hoof-horn, and are specially liable to chronic villitis. Blows to the coronet are the chief exciting causes, and the writer has also seen it follow upon a severe blistering, quittor, and sand crack.

Symptoms.—Chronic villitis most frequently affects the front region of the coronet. Sometimes it attacks but a small surface, at others it extends for some distance towards the quarters. It commences by swelling,

with some heat and tenderness to pressure over the affected surface. Lameness may or may not exist at first; but where the disease continues to extend, and the swelling becomes considerable, the foot is brought to the ground with the bearing thrown upon the heel, as in laminitis, and lameness is pronounced. The horn in front of the coronet, instead of being smooth, now presents a rough and broken appearance. It is loose in texture, and flaky masses may be broken away with the finger. The crust at this point has a tendency to develop a ring-like character, to crack cross-ways, and to separate from its connection with the coronary cushion. When this takes place there is a slight oozing of serosity, and blood and matter may also be discharged.

Treatment.—It is usually the case that no attention is given to this disease in its primary stage, and it is not until considerable swelling appears at the coronet and serious changes have taken place in the horn that any notice is taken of it.

All injuries to this region, however slight, should receive prompt attention. A day or two in the stable, with cold, wet swabs to the part and a mild dose of physic, may be the means of preventing the injury from assuming a chronic character. Where this has already become established the toe should be shortened, the heel of the foot lowered, and the heels of the shoe thinned from the quarters backward. The object of this is to take the bearing from the front of the foot and relieve the affected part. A mild counter-irritant may then be applied to the coronet every three or four days, but no attempt should be made to blister, nor should an irritant of any kind be employed if there is oozing or discharge from the junction of horn and hair. Moderate pressure to the enlarged coronet is attended with benefit in some cases. This may be applied by means of tea-lead folded in such a way as to bear equally upon it, and fixed by means of a bandage.

The patient may be turned into a wet pasture wearing the lead compress, after a course of counter-irritation to the coronet.

If there is oozing from the injured coronet the horse should be confined to a loose-box, and after the wound has been thoroughly cleansed with warm carbolized water it should be freely dusted over with iodoform and covered with a pad of cotton-wool. This, secured by a bandage, will serve to keep the dirt out and encourage healing.

When again put to work, care should be taken to keep the heel down and the toe short, so that as little bearing as possible be made to fall in front of the foot.

Although an animal suffering from this affection may by judicious treatment be kept in work for some time, the liability of the hoof to crack

at the coronet, or to be torn away from its connection with it, is always present, and may at any time call for rest and active treatment.

PRICKS AND WOUNDS TO THE SOLE AND FROG

The feet, notwithstanding their dense horny covering, are by no means proof against pricks and other penetrating wounds. In the operation of shoeing, a misdirected nail is often accountable for the former, and the sole of the foot is frequently injured by forcible contact with sharp substances such as glass, wire, nails, and other sharp pieces of metal, stick, &c.

Pricks in shoeing, although mostly referred to want of care on the part of the shoeing-smith, are by no means so frequently due to this cause as is generally alleged. Horses with shelly, weak feet, or feet whose crust is much broken away, sometimes render the safe lodgment of a nail an almost impossible task, and, however careful a man may be, such feet can only be shod at great risk. It is, however, true that badly-driven nails, the careless stamping of nail-holes, defective pointing of nails, and badly-fitted shoes are not infrequently responsible for injuries to the feet by pricking and binding. It is, however, to be borne in mind that some horses are of such a vicious and uncontrollable character as to render such accidents possible in the hands of the most careful workman. Apart from shoeing, horses doing town work frequently pick up nails on the road, in the forge, or in yards or sheds where packing is going on, or in other places where nails, fragments of metal or glass are always to be found.

The frog, its commissures and cleft, being the softer parts of the sole, offer the least resistance to penetrating substances, and for this reason it is here that injury most frequently occurs. The danger attaching to pricks to the foot is not confined to the puncture alone, but is materially added to by any septic matter which may at the time be conveyed to the "quick" or vascular structures within.

The injury may be comparatively harmless, or serious, or even fatal, in its effects, according to the depth of penetration and the nature of the structures concerned in it. This will vary from a mere puncture of the sensitive sole or frog to a more extensive and penetrating wound involving the pedal-bone, the perforans tendon, the navicular joint, or the navicular bone itself.

The immediate effects of a prick to the foot are not always such as to attract attention at once, and it sometimes occurs that several days elapse before its existence is suspected; but as time goes on, and the injured part inflames and suppurates, pain and lameness are developed, and a search after the cause is provoked.

It is good practice, in all cases of lameness where the cause is obscure, to remove the shoe and thoroughly explore the foot, and especially so where the lameness is sudden in its onset or the animal has been recently shod.

Not infrequently this task is omitted because the fetlock is enlarged, hot, and tender, and the conclusion is too hastily arrived at that the joint has been subjected to sprain. After days of acute suffering, the error is made known by the appearance of an abscess at the coronet, when it becomes clear that the swollen joint was the result of extension of inflammation from the injured foot.

In searching the foot every nail and nail-hole should be closely examined as the shoe is removed, and any moisture upon the one or oozing from the other must be taken to indicate mischief. A thin layer of horn should then be removed from the sole and frog, and the foot pinched round its outer edge, the operator noting at the time any flinching which may be evinced at any particular point. Where a prick is found to exist, all horn must be taken away from around it until the bottom is reached and the sensitive structures laid bare. If it is found that a piece of nail, or glass, or wire has been broken off and become embedded in the tissues, it can then be removed. Any neglect or oversight in this connection is likely to be followed by most serious results.

The wound must now be treated antiseptically. In the first place the foot should be immersed in a pail of warm carbolized water or a 3-per-cent creolin solution and thoroughly cleansed, after which the wound should be irrigated with a solution of biehloride of mercury of the strength of 2 parts in 1000. A thick pad of cotton-wool or some other suitable well-baked dressing should then be applied to the part and secured by a bandage or strips of wood stretching across from one side of the foot to the other, and fixed between the shoe and the crust. The foot may now be enclosed in a clean leather boot.

Should the inflammation be severe, it is desirable to administer a dose of physic, and a cold wet swab applied over the crust will be found to keep the horn moist and afford relief.

The wound will require to be dressed from time to time either with carbolic solution or dry dressing in the form of iodoform alone or mixed with boracic acid.

When overlooked or neglected these penetrating wounds give rise to serious complications, of which abscess in the foot is the most frequent development. As a result the horn becomes separated from the sensitive parts beneath, giving rise to that condition known as "quittor", which is treated of elsewhere. Necrosis or sloughing of injured bone may also be

among the results. Joints may be laid open, tendons and their sheaths inflamed, and the leg may swell as the result of inflammation extending along the cellular tissue (cellulitis) from the foot upwards.

In all these conditions the lameness is severe, and in some no weight can be borne on the foot. The animal stands with the toe lightly resting on the ground, lifting up the leg now and again and holding it suspended in the air as the result of pain.

The slighter injuries, when promptly attended to, readily yield to treatment and a few days' rest.

In all cases of pricks to the foot in which swelling of the coronet or persistent lameness remains after subsidence of the acute symptoms, a repetition of blisters over the pastern during a rest at grass will prove beneficial.

SIDE-BONES

Side-bones are hard, unyielding formations situated immediately above the coronet towards the heel. Pathologically considered, they consist in a transformation of the lateral cartilages into bone by the deposition into their structure of calcareous salts. This change is sometimes preceded by inflammation of the tissue of the cartilage, but in a large percentage of cases no such antecedent state exists.

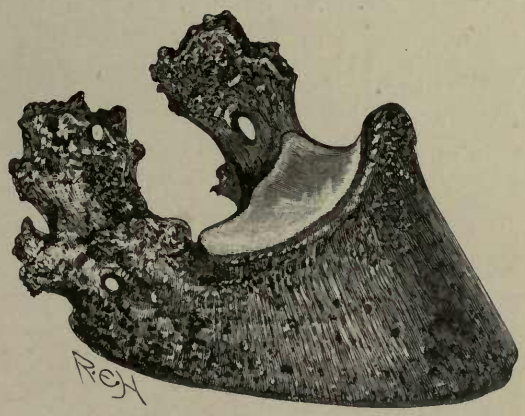


Fig. 401.—Pedal Bone, showing ossification of ligaments constituting "side-bones"

The liability to this disease is much greater in heavy than in light horses, and whether it occurs in the one or the other it almost invariably affects the fore-feet.

Before the days of the Shire Horse Society, a very large proportion of our heavy horses became victims of the disease, resulting in a diminution in their value from 25 to 75 per cent. Thanks to the rigid veterinary inspection instituted by this Society, and more or less completely adopted by others, the prevalence of the malady has been so far reduced as to encourage the hope of its becoming as rare as it was common.

Causes.—Side-bone is one of the most pronounced of hereditary diseases. Its tendency to arise in the progeny of affected animals is now known to every horse-breeder of experience, and we owe it to the growing recognition of this fact, and the more judicious selection of breeding stock, that the existence of the disease has been so largely curtailed. In some

families the hereditary disposition to side-bone is so strongly marked as to respond to the most feeble of exciting causes. These commonly take the form of blows to the coronet, concussion to the feet, sprain of the cartilages, too early and severe work, especially on deep strong land where short turnings and heavy pulls are required at the headlands. High-heeled shoes and high calks are also said to excite it, but these bear a small proportion, if any, to the other inducing causes.

Symptoms.—The actual presence of side-bone is made known when the cartilage or a part of it has become hard and unyielding and lost its natural elasticity and spring. This change, with rare exceptions, commences deep down at the point where the cartilage is connected with the pedal or "coffin" bone. There is, therefore, a period in its early development when it may not be recognized with certainty owing to its enclosure within the hoof. In the course of time, however, it becomes obvious to the touch, and in many instances to the sight also, appearing as a rounded prominence on the coronet towards the heel. The disease may affect only one foot, or both, or one side of a foot, or both cartilages may be involved at the same time or consecutively. In some instances side-bones are of slow growth, while in others the whole of the cartilage undergoes rapid ossification. Lameness is by no means a necessary result of side-bone. Numerous cases occur without giving rise to any obvious change in the animal's action, while others are attended with considerable pain or even complete disablement. In the latter examples the foot is hot, the action short, and the tread wanting in firmness, with an inclination to the sound side of the foot, if such there be. When in the stable the animal stands with the heel slightly raised from the ground, and if both feet are affected the weight is shifted from one limb to the other at longer or shorter intervals.

Treatment.—In all cases of foot-lameness in heavy horses where no obvious cause for it exists, side-bone should be suspected and prompt treatment adopted. Where a pond is available the horse should be made to stand in it two or three hours a day for a week, and should be afterwards blistered over the coronet and pastern every fortnight for three times, or oftener if required. In the intervals he should be turned into a damp meadow or river-side pasture, or into a yard well littered with peat or tan. Should blistering fail to remove the lameness, firing must be next resorted to. In old cases firing should be adopted at once. Cutting fissures in the hoof by means of a saw, or dividing the nerves of the foot, are the last and heroic measures of side-bone treatment.

NAVICULARTHRITIS—NAVICULAR DISEASE

This is a disease of the foot, and, excepting perhaps splints, one of the most common causes of lameness from which horses suffer. From a rough estimate, it may be said that not less than 60 to 70 per cent of our light horses, and more of the heavy ones than is generally believed, sooner or later become affected by it. Just as a splint is the bane of young horses, so is navicular disease the common affliction of old ones. While the former, however, is amenable to treatment, and seldom becomes permanently hurtful, the latter is practically incurable and progressively destructive, so that once established it goes on from bad to worse, and ultimately cripples its victim and renders him physically useless.

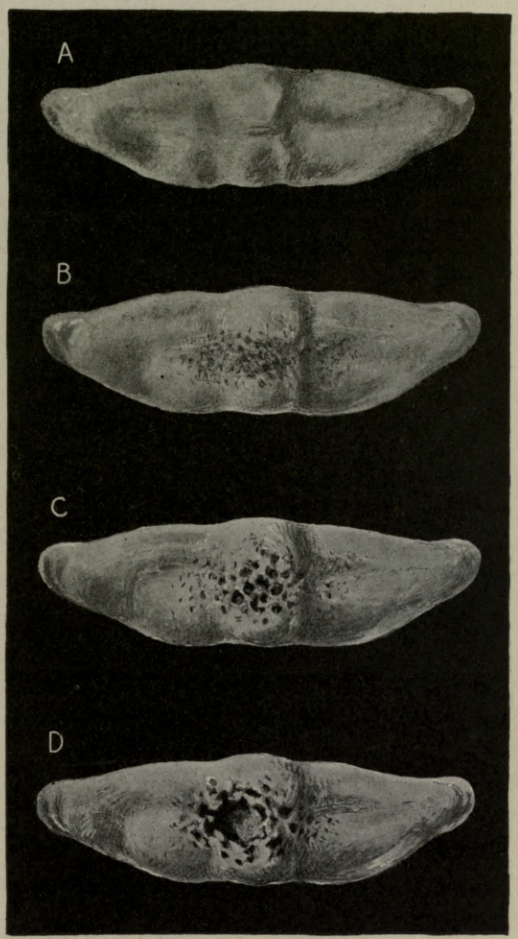


Fig. 402 —Navicular Disease

A, Healthy bone; B, Primary disease of bone, giving rise to softening and erosion of the cartilage at numerous points; C, Bone showing loss of cartilage and underlying excavations; D, Large carious surface resulting from confluence of small excavations.

It was not until the early part of the nineteenth century that anything was known of this most destructive ailment. Until then the lameness arising out of it had been for a long time attributed to various imaginary conditions, as well as some real ones, hence it received and became known by a variety of terms, according with the various views entertained as to its seat and origin. From its supposed existence in the muscles of the shoulder and chest it was by some designated "chest founder"; while others, regarding it as the result of contraction of the feet, spoke of it as "contraction", which was alleged by the leading veterinary authorities to arise out of a diseased condition of the sensitive laminæ intervening between the pedal-bone and the hoof. About the year 1804, Moorcroft, a

distinguished member of the veterinary profession, first indicated the actual seat and nature of the disease, which he spoke of as "coffin-joint lameness". A few years later Mr. James Turner very considerably added to our knowledge of the malady, since which time it has been known by the term navicular disease, and more recently as naviculararthritis.

As to the precise nature of the disorder, it is now pretty generally regarded by veterinary surgeons as an ulceration or caries of the navicular bone. Commencing at first in a subacute inflammation of the ossific structure, the bony tissue gradually undergoes solution and removal at one or several centres, as a result of which minute holes occur near to the surface and gradually extend themselves inward and outward, until two or more joining together form large ulcers and excavations, during which the articular cartilage covering the bone undergoes a process of softening and removal. The bone having lost its smoothness, now presents a rough and eroding surface to the flexor tendon on which it rests, with the result that by constant rubbing of the latter against the former, the tendon becomes irritated and inflamed, and later swollen and softened, when its weakened fibres gradually break away and impart to its articular surface a rough and ragged condition. Associated with these changes in the bone and tendon, chronic changes in the synovial membrane are also observed, so that one after another all the structures of the joint sooner or later become implicated in the disease. If during its progress the patient is allowed a prolonged rest, the tendon frequently unites with the bone, when all movement between the two ceases to exist. Rupture of the tendon and fracture of the bone are ulterior consequences of the disease.

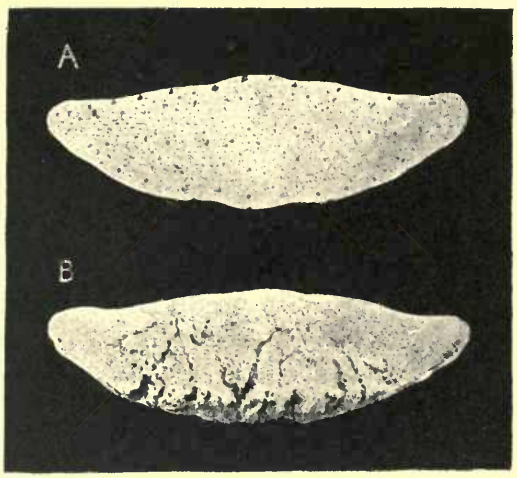


Fig. 403.—Sections of Navicular Bone, healthy and diseased

A, Section of healthy bone; B, Section of diseased bone permeated by carious tracts.

Causes.—From the great difference in susceptibility to this affection presented by different animals, and the evidence afforded by the family history of some, heredity would seem to exercise an important predisposing influence in its causation.

That bad shoeing, by inducing weakness and contraction of the foot, operates also as a predisposing factor there is no room to doubt, and

especially is this the case with regard to horses which are confined to the stable in a standing position for long periods, while receiving large quantities of highly stimulating food.

The exciting cause is almost invariably due to concussion acting upon feet deprived of their elasticity by long-continued abuse. Animals with high hammering action suffer most, but long-continued wear on hard roads affects all alike. The most sudden and acute cases are found among hunters as the result of encountering deep drops in jumping into hard roads under heavy weights.

Symptoms.—As we have seen, under ordinary circumstances navicular disease is slowly progressive, while in others it is sudden in attack, and runs from the first a more or less acute course. In the former case the onset of the disease is hardly perceptible. If in a riding horse, the first indication of the oncoming affection is mostly experienced by the rider, who recognizes a sense of discomfort in the animal's movements arising out of a loss of his ordinary elasticity and firmness of tread; but even this for a time is subject to variation, so much so, that the owner may be led to doubt the truth of his own impressions. As time goes on, however, evidence of another kind soon presents itself. The animal is noticed to move feelingly, at first on one limb only, then after a while on the other, and then on both; but it is rarely that the defect of action is uniform on the two sides. To-day it is worst on the near one, when the animal is induced to relieve it by throwing the weight of the body mainly on the off. This, however, soon results in aggravation of mischief in the latter, when the lameness becomes worse than in the former one, and so the relative severity of the disease alternates from time to time between one limb and the other.

As to the character of the lameness, it is peculiar in the increasing shortening of the stride, the gradual loss of knee action, and tendency to move the entire limb in a stiff and stilty fashion. The action altogether becomes short and wanting in liberty, and especially so on hard ground. On a soft surface when relieved of concussion it is less marked, but in advanced cases still evident even to the inexperienced eye.

The lameness in navicular disease is seriously aggravated by work, and is very pronounced on the morning following an active day. Moreover, as the disease becomes established, there is a disposition in the animal to relieve the heel of the foot from pressure and to throw it towards the toe. This has the effect of occasioning tripping and stumbling, and rendering the horse disagreeable if not actually unsafe both to ride and to drive.

Still further evidence of the existence of naviculararthritis may be found in changes taking place in the form and character of the feet. Here it is

observed that the heels become gradually narrow, the sole concave or arched, the quarters deep, the frog small and wasted, and the feet generally upright and blocky in appearance. Horses suffering from navicular disease are very liable to thrush, and the feet are warmer than normal. It cannot be said, however, that cold feet are inconsistent with the existence of the disease. It should be noticed that the contraction of the feet is seldom uniform, so that one will mostly be observed to be smaller than the other.

Some assistance in diagnosis may be obtained by careful observation of the posture of the patient when in the stable. In this connection it is observed that the feet are placed alternately in positions of rest, either by raising the heel from the ground, flexing the pastern, or advancing the foot straight out in front of the body—"pointing".

Treatment.—There is little hope of effecting a cure in this disease when once it is established, but a good deal may be done by judicious management to restrain its progress and palliate its effects. In the very earliest stages of the malady it is quite conceivable that a long rest on a soft damp surface and a repetition of blisters to the coronet might effect a cure; but it is comparatively seldom that any serious attention is given to the case at this early period of its existence, and it is not until some considerable advance has been made that a reliable diagnosis can be effected. All cases are benefited by a run at grass, provided the ground is fairly wet and soft; but in dry seasons, when these conditions are not only reversed, but flies are also troublesome, a considerable aggravation of the disease is likely to result. When rest and blistering are resorted to, the condition of the horse should be kept up; and when he returns to the stable the feet should be irrigated with cold water morning and evening, and covered with swabs in the intervals.

Setons inserted through the frogs were once very much in vogue, but the benefit resulting from them was not found to go beyond that derived from blistering the coronets. Where these measures fail, it only remains to relieve the animal from pain by dividing the plantar nerves and removing a portion to prevent their reunion.

It must be understood that the operation referred to does not check the progress of the disease. On the contrary, it rather tends to aggravate it; for all feeling having been removed from the foot, the animal ceases to favour it, and by indiscriminate use adds to existing trouble. Where horses are worked to the end after the operation of neurotomy, either the diseased bone fractures or the flexor tendon beneath it ruptures.

The first is evidenced by a return of the pain and lameness, attended with swelling around the coronet and a separation of the hoof from the sensitive structures of the foot. The second is manifested by a sudden

swelling appearing in the hollow of the heel, by which it is rendered convex instead of concave. At the same time the toe shows a disposition to turn up in consequence of the tendon having broken away from the pedal-bone.

CONTRACTED FEET

It is not far from the truth to state that there are few horses in active work whose feet are not more or less contracted. In saying so much, we are not overlooking the fact that horses' feet vary considerably in form and size in different individuals. Some are large, low at the heels, and otherwise weak, while others are narrow and deep and upright, with great strength and thickness of horn. Among the latter are found examples conspicuous for their length from before backward (mule feet), and also for their narrowness. Animals having feet of this conformation are not infrequently regarded with suspicion, and are even sometimes condemned as being the subjects of disease and consequent deformity. It is, however, the opinion of most experienced men that feet of this character and conformation, *i.e.* resembling those of the mule, are of all kinds the best and most enduring. As, however, we have previously observed, all, whether they be of one description or another, become more or less contracted under the influence of domestication and the abuses of shoeing (fig. 404).

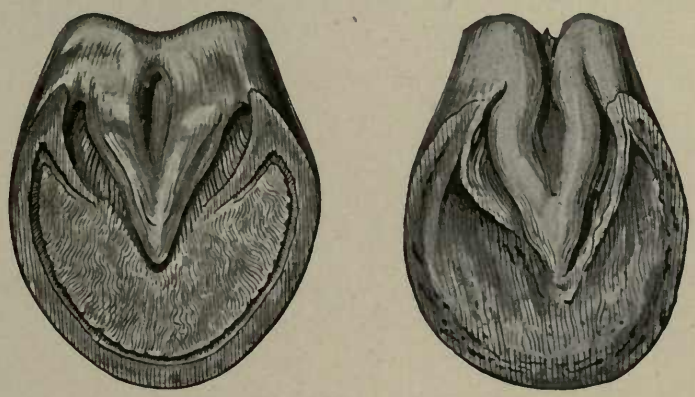


Fig. 404.—Normal Hoof and Contracted Hoof

It must be recognized that a certain measure of contraction is quite consistent with freedom from lameness and disease; but there can be no doubt that the persistence of such a state, and the conditions by which it is fostered, will sooner or later impair the general function of the foot and lay the foundation for structural change.

It needs hardly to be observed that in a state of nature the unshod foot enjoys the fullest liberty, and every part is free to act in unison with every other; indeed, under these circumstances the natural form and dimensions are maintained by a just proportion in the waste and repair of the healthy parts; but when, as in domestication, the balance of these two

forces becomes upset, then it is that deformity and disease usurp the place of symmetry and health.

The causes that conduce to this unhealthy state are several, the first and most pernicious being the operation of shoeing.

Here the very means designed to defend the foot expose it to the worst forms of abuse, viz. removal of the frog or sole, cutting away the "bars", and rasping the surface of the crust. By paring down the frog, this all-important organ, by nature intended to meet the ground, and by so doing to open out the heels, is thrown out of action; wasting and shrinking, the consequences of inactivity of the mutilated parts, then soon appear, to be followed by obvious contraction. If, as is usual, the bars, which may be deemed to be the buttresses of the heels, are also pared and weakened, the mischief is profoundly aggravated; and it is still more so, when to these habitual evils of shoeing is added the equally grave one of rasping the surface of the crust. By this mischievous practice the natural defence against evaporation of moisture from the foot is removed and a state of morbid dryness induced, which not only conduces to brittleness of the hoof, but also to contracting of the already weakened heels.

Long-continued standing and forced rest, which some horses experience, broken only at intervals by short periods of exercise, lend themselves to this evil consequence by throwing the entire foot out of use. Inactivity, especially when accompanied by high feeding, sooner or later ends in abiding congestion of the feet. This is followed by wasting of the sensitive parts, contraction of the hoof, and slowly-developed lameness, the cause of which is seldom suspected. In presence of the abuses referred to, work, like idleness, brings about the same result. Removed from contact with the ground, the frog ceases to perform its natural office, and while both feet and legs endure the jar against which it was designed to protect them, it at the same time shrinks and wastes for want of work, ending sooner or later in atrophy, deformity, and disease. To avoid contraction of the feet, the frog must be allowed to come to the ground, the bars must be preserved in their natural strength, and paring the sole and rasping the surface of the crust must be forbidden. Long standing in stalls should, as far as possible, be guarded against, and where rest is to be unbroken, the shoes should be removed and the horse allowed his liberty, either in a box well littered with tan or peat-moss, or in a yard or soft pasture where every part of the foot would be brought into action. On the Continent, and more recently in England, mechanical contrivances have been devised and applied with the object of restoring contracted feet to their normal condition. The means employed for this purpose is a shoe made with two movable heels having on the foot surface a small sloping wedge which is brought to bear on the inner sides of

the heels of the foot, and then by means of an expanding screw passing from one heel of the shoe to the other outward, pressure is made on the parts, and by increasing the force from time to time the heels are caused to open. It need hardly be said that the change brought about in this way can only be temporary, and may be mischievous. As the foot contracts by wasting, so it must expand by growth, and to render the change permanent there is necessary the exercise of those natural forces which regulate its vital activities and conduce to re-establish in it a condition of health.

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20. DEFECTIVE ACTION AND INJURIES ARISING OUT OF IT

STRINGHALT

This is a spasmodic upward jerk of the limbs during progression. It is chiefly observed in the hind extremities, but rarely also affects the fore ones.

In the former it is marked by a convulsive flexion of the hock, when the canon is raised high up towards the abdomen, with which it is on occasions brought into contact. This disordered movement may affect one or both hind-legs equally, or in different degrees.

It is almost exclusively confined to the walk and the trot, and varies from time to time in the suddenness and extent of the morbid movement. It is exaggerated after rest, and also by excitement. In many instances horses are taken to shows which while at home are perfectly free from the defect, but which no sooner get into the show ring than they develop stringhalt in a very marked form.

In some animals it is very slight, and only observed in turning. In others it is intermittent, and only seen now and again. Hackneys, whose hock action is now so much developed, are more frequently affected by it than any other variety of the horse.

Stringhalt has been attributed to a variety of causes—some anatomical, others pathological—and it has been variously located in the stifle, the hock, and the pastern, and attributed to laceration of muscles of the thigh, to rupture of the tendons inserted into the point of the hock, and to ulceration of joints. In this country it is pretty generally regarded by veterinarians as a nervous affection, but the proof of this, as of all other alleged causes, is still wanting.

INTERFERING

In this term are included a variety of disordered movements, during which the foot of one limb is brought into more or less forcible contact with another, giving rise to wounds and contusions of various degrees of severity on the part struck.

Brushing, cutting, overreaching, and speedy cutting are the more common defects to be dealt with under this heading.

BRUSHING

This takes place when the foot of one limb habitually though lightly strikes the inner side of the fetlock or coronet of the corresponding leg of the opposite side. The defect may be confined to one leg in front or behind, or it may involve two, or the whole of them. A repetition of the act causes soreness and swelling of the part struck, and may induce lameness.

CUTTING

Cutting is distinguished from brushing only in the fact that the blows are more severe and inflict a wound in the skin.

Causes.—Conformation plays an important part in disordering the movements of the limbs and inducing these injuries.

Large, spreading feet, long, sloping pasterns, with inward or outward inclination of the toes, also conduce to it. In the latter case there is always a tendency on the part of the fetlock-joints to approach each other, and the more pronounced this is the greater is the risk of striking.

Weakness from old age, overwork, insufficient food, or disease is also a fruitful cause.

Young horses fresh from the pastures, which have not yet learnt the use and control of their legs when under saddle or between shafts, are most commonly addicted to brushing and cutting, and especially when tired or out of condition.

Defective shoeing, especially when coupled with faulty conformation, also conduces to this mishap. A shoe fitted too full, *i.e.* allowed to project beyond the crust on the inner side, is a frequent cause of it in young horses and in others when tired.

Cutting occurs much more frequently in the hind fetlocks than in the front ones, particularly where horses are engaged in carriage work.

This discrepancy in favour of the front legs may, as Goubaux and Barrier affirm, be "owing to the fact that the separation between the hind-

feet is generally less marked than that between the fore-feet"; but we are of opinion that this is not the only cause of the difference. The hind limbs being more especially engaged in propulsion, are more likely to have their line of action disturbed in acting upon the ground than the fore ones, which are more essentially supports, and it is not unlikely that the existence of calkins on the hind feet tends still further to misdirect the movements of the limbs.

Horses whose legs are long and set close together on a narrow trunk are frequently the subjects of brushing and cutting, as are also others whose feet are brought close to each other by the inward tendency of their limbs.

Cutting may also result from the accidental displacement of a shoe, or when the clinches are badly laid down.

However well balanced a horse's movements may be, he is often induced to cut when travelling over slippery roads.

The more serious effects of brushing and cutting are:—(1) Injury to the plantar nerve as it passes over the fetlock-joint; (2) bruises to the sesamoid bones, which may provoke an ossific growth; (3) destructive cellulitis, resulting from the introduction of septic matter into the wounded skin.

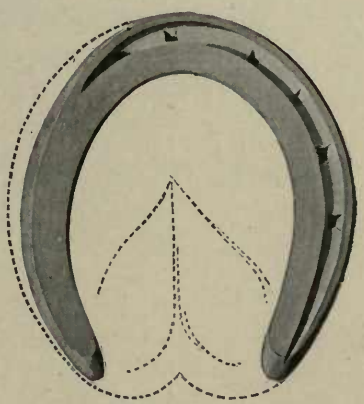

Fig. 405.—Shoe to remedy "cutting"

Any attempt to mitigate or overcome this defect must be based upon a consideration of the cause out of which it arises. Where defective conformation is the cause, some attempt must be made to alter the direction of movement by the employment of a specially-formed shoe; what particular shape it should take is a question which has often to be decided by experiment. Before anything is done in this connection, the feet should in all cases be carefully examined without the shoes. It will then be seen whether there is any difference in the height of the inner as compared with the outer quarter of the wall, and whether the foot is taking a regular bearing all round.

Any disparity in the first point should be rectified, and the crust made level from heel to toe and from side to side. Where these conditions have been provided, a shoe should be tried whose inner branch is somewhat straight, and fitted well under the edge of the hoof (fig. 405). If this has not the desired effect, the edge of the crust of the inner quarter must be rasped down, the inner branch of the shoe made narrow, deep, rounded off at the edge, and fitted well under the crust.

The blow is usually inflicted by the inside toe, but may also be caused

by the heel, especially in those cases where the toes are turned out. It may likewise be delivered by the middle of the crust, when the clinches, if not properly laid down, occasion nasty wounds in the skin.

It is very difficult, and sometimes impossible, to prevent this faulty action. Horses with long pasterns, whose toes turn out, are perhaps the least amenable to treatment. In these cases the injury may be inflicted by the inner part of the toe or by the heel, against both of which some provision should be made. A shoe with the inner branch straight, set well under at the heel, and well rounded off at the inside toe, is most likely to minimize the trouble if it does not altogether remove it.

Where this fails, a three-quarter shoe (fig. 408) with the toe similarly dealt with may be tried.

In old horses work should be apportioned to their powers, and young ones should be carefully conditioned and trained in the various evolutions they will be required to perform before being sent to active work. The weak must be strengthened by good living, and the sick withdrawn from work.

OVERREACH

This results when the toe of the hind-foot strikes the heel or coronet of the fore one on the same side. Somewhat serious wounds are occasionally

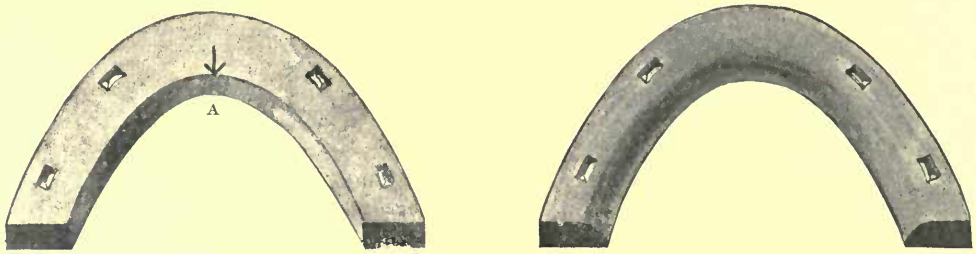

Fig. 406.—Overreaching

A, Point of Contact. Toe of Shoe with rounded inner edge.

inflicted by this movement, and horses are not only lamed, but riders are sometimes dismounted, and suffer serious injuries in consequence.

The damage to the fore-foot is inflicted by the inner margin of the toe of the hind shoe, and not, as is frequently supposed, by the front or outer edge.

This accident is favoured by that peculiar conformation in which a short body is set upon long legs. Animals low in front are also more predisposed to overreach than others of the reverse type, and the danger is augmented when the hind-feet have been allowed to grow unduly long.

It mostly results when horses galloping over heavy land fail to get their fore-feet clear away from the ground before being overtaken and

struck by the hind ones. Jumping on to rising ground, or being suddenly checked when going at racing speed, are not uncommon causes of the mishap.

As a means of preventing overreach, the hind shoes should be rounded on the inner edge of the toes. If the hind-feet are overgrown, they should be shortened and the shoes well set back behind the margin of the toe. The fore-feet also must be kept within reasonable limits in regard to length.

FORGING

This is a defect in the action of the limbs which allows the toe of the hind shoe to strike the under surface of the corresponding fore one. The

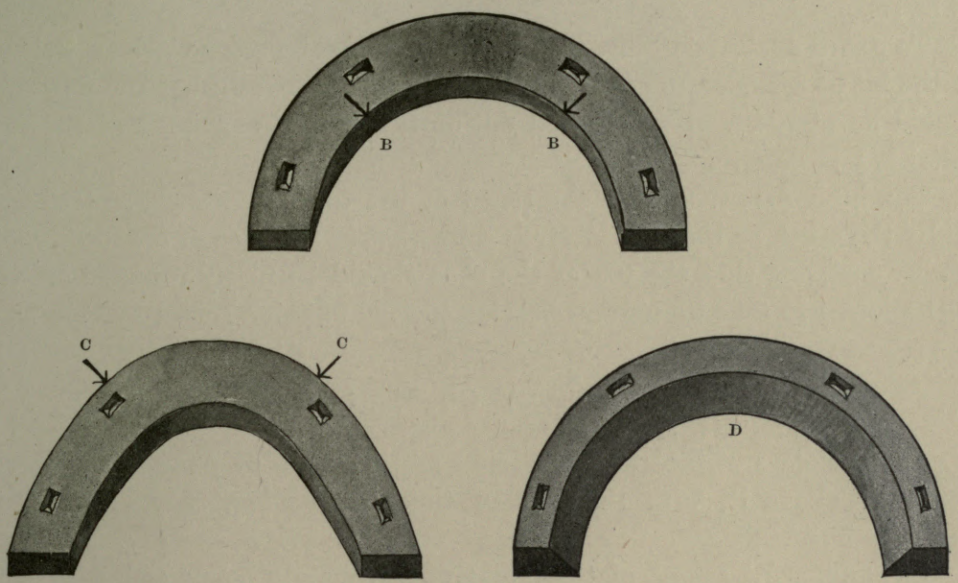

Fig. 407.—Forging

B, B, Points struck in forging; C, C, Points on Toe of Hind Shoe which strike the Fore Shoe. D, Toe of Fore Shoe with inner edge bevelled.

point struck varies in different cases, and may be anywhere between the toe and the heel. The striking point of the hind shoe is the toe and parts to right and left of it. Besides the loud clacking noise produced by this disordered movement, the heel of the fore-foot may suffer injury, the shoes may be pulled off, or the animal may be thrown down by locking of the hind and the fore shoes.

As in overreach so in forging, conformation must be recognized as a predisposing factor. Leggy horses with short bodies, and others whose hind limbs are too much inclined forward, display a special liability to this defective movement.

Young animals, however well set up, when weak or fatigued by over-exertion, frequently forge until an improved condition is established. Loose and careless driving encourages any tendency to it that may exist from the causes referred to above.

Forging is sometimes determined by defective shoeing. The hind-feet are not only allowed to grow unduly long, but the shoes are fitted full and given too much prominence at the toes. Where these conditions are allowed to exist behind, they are almost invariably present in front as well. It results from this that the long fore-feet do not clear the ground before being overtaken and struck by the long hind ones.

The feet in these cases may not appear to be of undue length, but in relation to the peculiar long-striding action of the animal they often prove to be so.

To guard against forging, it is important that horses be driven well up to the bit at a moderate pace, well fed, and not overworked. The fore shoe should be narrow and well seated out on the ground surface, and the foot restricted in length.

The hind-foot should be shortened at the toe, and the shoe fitted well under the crust, so that the latter is somewhat in advance of the former. It is also desirable that the toe of the shoe should be nicely rounded off, the heel allowed to take its natural bearing instead of being raised by calkins.

SPEEDY CUTTING

When horses strike the inner side of the knee, or parts immediately below or above it, with the foot of the opposite leg, they are said to "speedy cut".

Causes.—All causes of this accident are mainly connected with conformation and action. Thus horses with narrow chests, whose legs are close together, are particularly liable to it, and especially so if the toes should happen to turn out, or the legs be set too far back. The tendency to speedy cut is considerably aggravated by weakness and fatigue, hence the mishap occurs most frequently in ill-conditioned animals, or in those better conditioned at the end of a journey, when tired and incapable of exercising full or complete control of the limbs.

The liability to this mishap is materially increased by the mode of action, but it does not, as has been said by some, arise entirely in consequence of this being "high". The worst speedy cutter the writer ever saw was an animal whose action was quite the reverse of this.

Any horse may "speedy cut" by an accidental movement in galloping or in draught, but the habitual "speedy cutter" almost invariably presents

some defect of conformation. The danger resulting from it is not only that it tends to disfigure and to provoke lameness in the animal itself, but equally so in that it tends to stumbling and to imperil the safety of the rider or driver.

Symptoms.—These are shown in the act of riding and driving by an occasional stumble, or the animal may halt and go lame for a few strides, or continue so for some time, according to the severity of the blow or the soreness of the part from previous injury. Where the injured limb has been recently struck, a very slight blow on the previously injured part will excite acute lameness. In some animals the local symptoms are but slight, and seldom exceed a superficial abrasion with slight chronic thickening of the skin. In others deep contusion results, when the part becomes hot, swollen, and painful to the touch, or a serous abscess may develop, which will be known by the sudden appearance of a soft, fluctuating enlargement on the part struck. In cases where the injury is severe and deep matter is sometimes formed, the leg becomes generally enlarged, and acute lameness results. Chronic callous swellings arise after a repetition of such injuries, and the bones of the knee may become involved in the disease. Where these latter conditions exist the joint is imperfectly flexed, and the action permanently impaired.

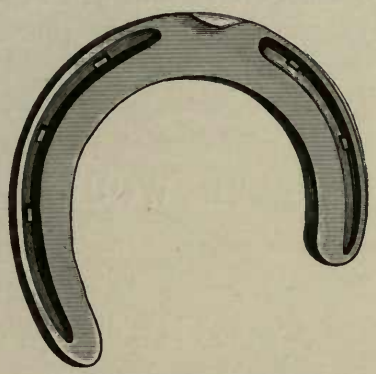

Fig. 408.—Three-quarter Shoe

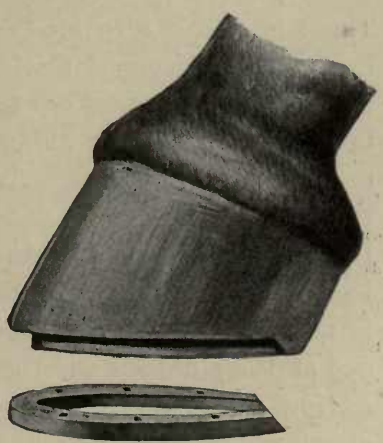

Fig. 409.—South's Rational Shoe (Charlier system).

Treatment.—Simple contusions will require to be met by hot fomentations or hot bandages applied to the injured part. This, conjoined with rest and a mild dose of physic, will generally suffice to effect a cure. Where an abscess is developed, whether containing serum or pus (matter), it must be laid open and the contents evacuated. The wound should then be freely irrigated with carbolic or some other antiseptic solution, and covered over with a pad of cotton-wool held on by a firmly-adjusted bandage. If after the wound has healed any thickening remains, a mild blister may be applied, and repeated once or more, if necessary. Any enlargement of the part remaining after treatment will render it liable to be injured again.

Prevention.—In regard to prevention, this must take the form of protecting the limb, and giving an altered form and bearing to the offending foot. The former may be effected by the application of a suitable boot. The latter will require that the inner quarter of the crust be rasped down and the shoe fitted close in. Three-quarter shoes (fig. 408) or the Charlier system (fig. 409) may be tried where the other methods fail, and the feather-edged shoe will in some instances have the desired effect. Speedy cutters should not be allowed to wear their shoes too long.

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21. WOUNDS AND THEIR TREATMENT

WOUNDS

A wound is a division or rent in the soft parts of the body, the result of violence.

Wounds differ in kind according to the manner of their production, and are classed as follows:—

1. Incised Wounds.
2. Lacerated Wounds.
3. Contused Wounds.
4. Punctured Wounds.

There is also a fifth kind—poisoned wounds—which includes all wounds into which poisonous matter or virus has entered.

Incised wounds are such as are produced by a sharp-cutting instrument, as a razor or knife. Here the divided surfaces are smooth and regular, and lend themselves most readily to readjustment. Moreover, the healing process in this description of wound is greatly favoured by the absence of any bruising or tearing of the flesh. The liability to hæmorrhage is much greater, however, than in the other varieties. This is referable to the fact that the vessels, instead of being torn and frayed out at their broken ends, are cut clean through, so that the blood, besides having a free and open passage, meets with no broken shreds of tissue about which to coagulate.

Lacerated wounds result when hooks or blunt instruments enter the flesh and are forcibly torn out. In this case the broken surface is more or less rough and irregular, and loose shreds of tissue sometimes hang from the divided parts. Bleeding is much less considerable than in incised wounds, as in the breaking of the torn vessels their coats become detached from each other, and the inner ones are retracted within the

outer one, and thus help to plug up the orifice. Then again, the torn end of the vessel affords a rough and ragged surface about which the blood more readily coagulates than when the vessel is clean-cut.

Contused wounds are produced when, in addition to a division of the tissues, the surrounding parts are more or less bruised. The contusion or bruising, when considerable, has the effect of rupturing the vessels and causing the injured parts to be infiltrated with blood after the manner of a black eye, or it may so far damage the tissues as to cause them to die and to slough. In any case their vitality is impaired to a greater or less extent, and the power of healing correspondingly diminished. Contused wounds, therefore, as we shall presently see, require special consideration in the matter of treatment, since it is not only necessary to bring the divided surfaces together, but to restore vitality in the injured part.

Punctured wounds are produced by stakes, and pricks with small, sharp- or blunt-pointed instruments, as when nails enter the feet, and stable-forks the limbs and other parts of the body. Here, as in the case of incised and lacerated wounds, the tissues will be cut by a sharp-pointed instrument, and torn by a blunt one. In the latter case there would be, in addition to the severance of the tissues, more or less bruising of the parts through which it passed, and, as in the case of a contused wound, healing would be rendered more difficult, and the condition of the part more dangerous. It is not, however, to these considerations alone that punctured wounds owe their importance. They are usually deep, and the divided surface of the tissues is out of sight. Deep-seated vessels, nerves, and other structures may be severed, and, what is of the first importance, dirt, decomposing matter, or a part of the instrument itself, may lodge in the wound and complicate the injury.

Poisoned Wounds.—These are wounds into which one or another of the many forms of poison or virus has gained admittance, either at the time when it was inflicted, or afterwards by accidental contact with them. Although wounds, and the body generally, may suffer by the entrance of mineral poisons, those derived from the vegetable or animal kingdom are by far the more common and hurtful. Nor does it always require that the animal supplying the poison should itself be the subject of disease, as shown by results which follow the sting or bite of insects and serpents. Most commonly, however, animal poisons are either the products of disease or decay. The former is exemplified in the bite of the rabid dog, and the contamination of a healthy wound with the virus of glanders; while the latter finds expression in the inoculation of wounds by decomposing animal matter.

HEALING OF WOUNDS

The manner in which the divided surfaces of a wound are united is not always the same. How this will be effected will depend upon a variety of circumstances, notably the time which elapses between the infliction of the wound and the readjustment or apposition of the parts, the manner in which they are brought together, the nature of the cut surfaces, the presence or absence of foreign matter, the extent of injury done to the surrounding tissues, &c. The time occupied in the process of healing, as most people know, may be very short or very long, according to the extent of the wound and the particular method by which healing is effected.

By careful observation and enquiry, it has been shown that the healing of wounds may take place in five different ways, viz.:—1. By *immediate union*. 2. By *primary adhesion*, or union by the adhesive inflammation. 3. By *blood-clot*. 4. By *granulation*, or by the second intention. 5. By *scarring under a scab*. To the lay mind, these expressions do not convey much meaning, but by a little explanation they may be made just as intelligible as they appear to the professional reader.

Immediate Union.—In healing by immediate union, the divided parts, on being brought together, are caused to adhere in the first instance by the sticky nature of the matter which then covers their surface, and in a short time—sometimes not more than twenty-four hours—a firm and perfect connection is re-established between the previously divided parts. Examples of this kind of healing are noticed when, on cutting the finger, the parts are brought together and tightly bound up, when, on removing the wrapping, complete repair is found to have been effected without inflammation or discharge, and with little or no pain or swelling.

In this case no scar remains to mark the seat of the injury, and no new tissue intervenes between the newly-united surfaces; they have simply grown together.

Primary Adhesion.—Here, instead of the divided parts growing together directly, as in immediate union, without the intervention of new material, the two surfaces of the wound become covered over with a thin layer of cells incorporated with a quantity of adhesive matter which has exuded from the vessels. Some of the former resemble the round, colourless corpuscles of the blood, but they soon begin to change their form by lengthening out into thread-like bodies, and ultimately to be resolved into a layer of connective tissue by which the divided parts are firmly and permanently reunited. In the course of these changes, new blood-vessels from the old ones in the adjoining tissue shoot out into the uniting sub-

stance, and organization having been thus established, repair is completed by the growth of a layer of cuticle over the united parts. This mode of healing is unattended by any local or general disturbance, and illustrates what takes place in "healing by the first intention".

Healing by Blood-clot.—Healing by blood-clot differs but little from that just described. It occurs when, in consequence of the edges of a wound not being brought immediately into apposition with each other, the space between them becomes filled with blood-clot, into which white blood corpuscles and plasma cells soon penetrate.

By a process of development the latter are resolved into fibrous tissue, which, as in healing by the first intention, form the permanent bond of union between the divided parts. These two modes of union can only be effected where the lips of the wound are undisturbed and all causes of irritation are excluded.

Fig. 410.—Wound Healing by Granulation

1, Discharge. 2, Margin of sore. 3, New epithelium at edge of sore. 4, Epithelium unaffected by the wound. 5, Blood-vessel. 6, Deep organizing layer beneath granulation. 7, Hair.

Healing by Granulation.—If, instead of healing by one of the three methods referred to above, an incised wound be left open, it is noticed that the surface soon becomes coated over with a pale, glairy substance composed of white blood cells in the midst of a quantity of sticky albuminoid matter, which together have passed out of the blood-vessels of the part. Sooner or later, according to the extent of damage the tissues have sustained, small, raised points begin to appear here and there above the glairy film, until the entire surface of the wound is dotted over with little, rounded, fleshy-looking granules, or, as they are termed, granulations. These by enlarging coalesce or run one into another, and having formed a continuous layer on the surface of the wound, begin again to throw out granulations as before, and by a repetition of the process the breach is filled in and repair is completed (fig. 410). As the granulations grow and mature they soon begin to shrink, and in doing so draw the sides of the gaping wound together. At the same time they lose their red colour, become dense and firm in con-

sistence, and are finally resolved into a tough connective tissue, as indicated by the white, glistening scar which remains on the site of the wound.

As to the nature and source of granulations, they are made up of little heaps of closely-packed cells permeated by minute blood-vessels. The former are derived from connective tissue cells which previously existed in the injured structures, and which, under the influence of irritation excited in the part as a result of the injury, have been caused to multiply, while the new vessels with which they are supplied are offshoots from the old ones. In this mode of healing, many of the cells intended for the purpose of tissue-formation die and are cast off as pus cells, and constitute the white, creamy discharge commonly termed "matter".

When, in the course of healing, granulations are in excess, and project beyond the wound as a fleshy excrescence, they are usually spoken of as "proud flesh".

The three forms of healing first referred to are unattended with danger or suffering to the patient; but in the more prolonged process of suppuration and granulation involved in the fourth, various complications may arise by which the general health is more or less seriously impaired, or life imperilled. These untoward results occur for the most part before the surface of the wound is completely covered with granulations, and are brought about by the entrance of bacteria into the wound, and their reproduction there, giving rise to what is commonly termed "blood-poisoning".

Besides contaminating the blood, bacteria also operate prejudicially against the healing of wounds. The chemical products they give out irritate and inflame the injured part, and produce a more or less copious outflow of pus, and delay the healing process.

Blood-poisoning presents several forms and degrees of severity, from a slight traumatic fever to a fatal collapse, or the development of a succession of abscesses in different parts of the body, extending over a more or less protracted period.

The fluids contained in and upon the surface of a wound serve as a suitable habitat or breeding-ground for a variety of micro-organisms, which not only undergo rapid multiplication, but in the course of their growth and development give off chemical products which in certain conditions of the wound become absorbed into the system, and produce that form of blood-poisoning known as *septic intoxication*. Large wounds are the more dangerous because of the large supply of this septic product they yield, and the greater extent of absorbing surface they present. The period of greatest danger is during the first six or seven days, or until the wound becomes covered with granulations, which form a barrier against the absorption of the poisonous bacterial products.

In addition to the poison they form in the wound, some micro-organisms are themselves capable of entering the blood and tissues of the body. Here they grow and multiply, and add to the store of poison entering from without, and by their presence produce that condition of the body known as *septicæmia.*

When the invading organisms enter the blood in large numbers, they may provoke it to coagulate around them, and the small clots so formed, by plugging the capillary vessels, form scattered centres of inflammatory action and pus formation in different organs and parts of the body, constituting another variety of blood-poisoning—*pyæmia.*

The more seriously the tissues are damaged at the time when the wound is inflicted, the more vigorous is the growth and action of the invading organisms. The diminished vitality of the one having reduced their powers of resistance, renders them more amenable to the action of the other. It is for this reason that torn and contused wounds heal so much more slowly than others inflicted with a sharp instrument.

Although, as we have seen, the evil consequences resulting from bacteria and their products may be serious, and even fatal, their occurrence in the horse is, comparatively speaking, rare. Every day horses with deep, gaping wounds may be seen, having no protection of any kind, and little or no medical care, yet they pass through their trouble with little or no more discomfort or suffering than is occasioned by the prolonged period of healing resulting from the local inflammation which the micro-organisms and their products excite.

Still, notwithstanding the natural resistance which wounded flesh offers to the entrance of bacteria and their products into the system, it happens from time to time that the one proves too feeble to exclude the other, hence it has been found necessary in the treatment of wounds to resort to special methods by which to destroy and exclude from them all offending organisms. This mode of treatment, first devised and practised by Lord Lister, is known as the antiseptic system. It is based on the fact that such bacteria as prove inimical to wounds, and endanger life by poisoning the blood, are capable of being destroyed or inhibited in their action by the application of various dressings composed of certain chemical substances in the form of powder or solution. The more common agents employed for this purpose are carbolic acid, perchloride of mercury (corrosive sublimate), iodoform, boric acid, &c. See pp. 420, 421.

Healing under a Scab.—This is nature's method of repairing wounded parts, and in suitable circumstances the best that can be devised. It is well illustrated when, after the surface of the skin has been broken, the blood and other exuded matters are allowed to dry upon it,

and form, as they will, a complete defensive covering or scab. In this condition all foreign substances which would irritate and inflame the wound are excluded from it, and so long as this state continues, healing proceeds rapidly without interruption. Anything, however, that inflames and provokes the formation of pus (matter) beneath the scab, interferes with the process and delays reparation.

GENERAL TREATMENT OF WOUNDS

As wounds vary in their nature and character, the details of treatment require to be modified accordingly. There are, however, certain general principles applicable to wounds of every description which must be observed if treatment is to be made a surgical success. In this connection the chief objects to be attained are:—(1) To arrest hæmorrhage; (2) to cleanse thoroughly and free the wound from all dirt and foreign matter; (3) to render the broken surface aseptic; (4) to bring the divided parts into close apposition with each other and retain them in that position; (5) to exclude all dirt and micro-organisms from the wound after adjustment; (6) to prevent movement of the part and avoid all other sources of irritation.

A certain amount of inflammatory action results when a wound is inflicted, and this will be greater or less according to its size, the period of exposure after infliction, and the mode of production. Serious inflammation tends to retard healing, and should therefore be kept under control as far as is practicable. The common practice of applying hot oils to wounds is much to be deprecated, inasmuch as they produce inflammation and increase the discharge of pus, and interfere with the healing process.

Arrest of Bleeding.—The method to be adopted for this purpose will depend upon the size of the divided vessels. When these are small, the less the part is interfered with the better. A short period of exposure to cold air will usually suffice to stop the flow; should it fail, the edges of the wound may be brought together with gentle pressure, or the wounded surface may be irrigated with clean cold water, or pressed upon for a minute or two by a pad of clean lint or cotton-wool soaked in a solution of tincture of iodine in the proportions of 20 drops to the ounce of water.

When the hæmorrhage is profuse, and the blood spurts out or flows away from certain points of the wound in distinct streams, the divided vessels must be sought for, and either twisted, or raised with forceps and tied round with aseptic gut or silk. It should be pointed out, however, that ligatures tend to retard the healing of wounds, and where possible should be dispensed with.

Cleansing.—When hæmorrhage has ceased, the time will have arrived for cleansing the wound and preparing it for adjustment. This should be done with gentleness and care, lest bleeding be induced to recur.

Everything brought into contact with the wound should be clean, and rendered aseptic by suitable dressings. The removal of all adherent blood

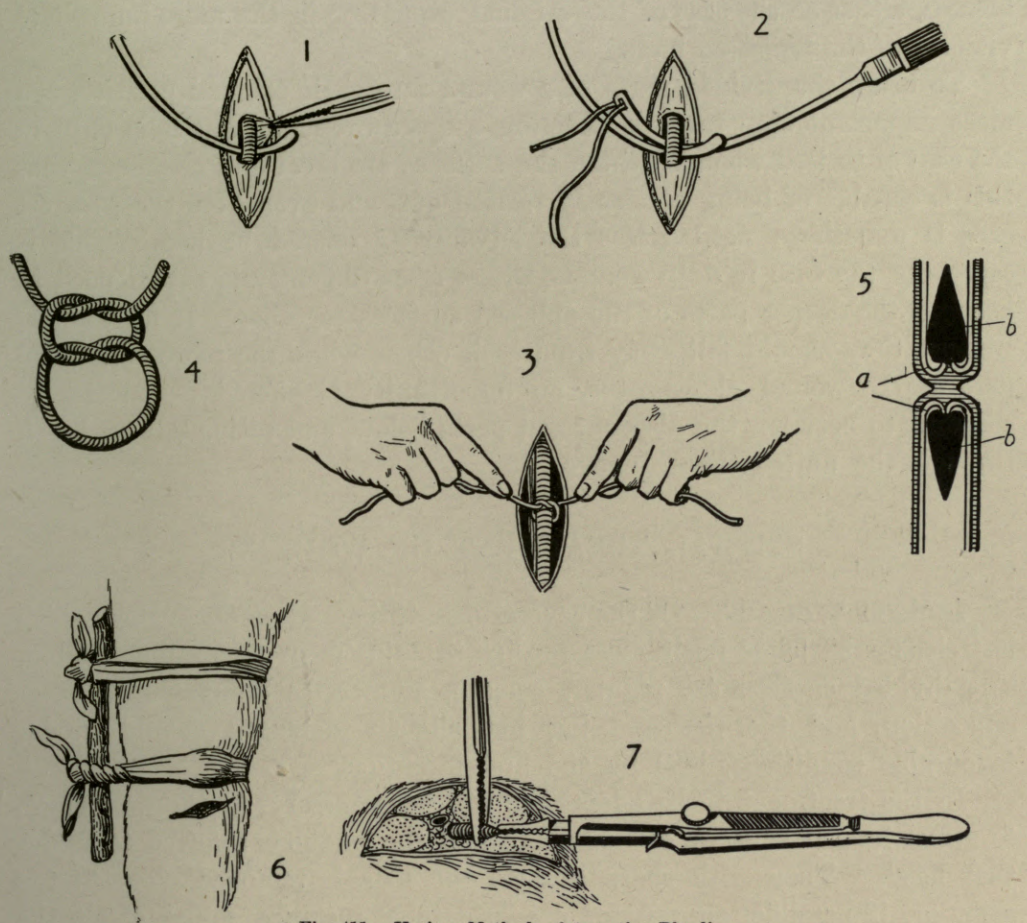

Fig. 411.—Various Methods of Arresting Bleeding

1, Probe lifting an artery while the forceps hold back its sheath. 2, Needle inserted and threaded. 3, Tying a ligature. 4, Correct knot for a ligature. 5, Effect of a ligature on an artery: *a*, the severed ends of inner coat turning inwards; *b*, *b*, blood-clots. 6, Checking bleeding by a tourniquet. In the illustration a pad is placed on the artery and bound down by a bandage; a stick is used as a tourniquet, and is kept in position by a second bandage. 7, Closing an artery by torsion. The artery is seized with one pair of forceps and twisted about twelve times by the other to sever the inner coat.

and foreign matter may be effected by allowing a stream of cold carbolized solution to flow over the wound, and if necessary the surface should be carefully wiped over with a loose pledget of wool or lint soaked in carbolized water or some other disinfectant. In penetrating wounds inflicted by stakes and other sharp implements, broken splinters are sometimes left behind, and unless sought for and removed will prove a source of lasting

trouble. They invariably give rise to profuse suppuration and discharge of matter, which only ceases when the offending body has been removed or passed away.

In some instances wounds containing fragments of foreign substances will heal over, only, however, to break out again after the formation of an abscess, either at the seat of the original wound or in the more immediate vicinity of the impacted body.

To bring the divided parts of a wound into their original position is a most important step towards effecting a speedy reunion, but it is only in the case of incised wounds, where the surfaces are level and clean-cut, that this is capable of being efficiently carried out, and even here the greatest care is sometimes needed lest the advantages offered be lost. This is especially the case in deep wounds, where some difficulty is experienced in keeping the deeper parts of the apposed surfaces together. If for want of support they should fall away from each other, while the more superficial part of the wound closes over, an opportunity is offered for matter to accumulate between the disconnected parts below, and ultimately to break through the united tissues above.

SPECIAL TREATMENT OF WOUNDS

Incised Wounds.—Of the several descriptions of wounds, that which is "clean-cut" lends itself most readily to adjustment and rapid healing. The divided surfaces are regular, smooth, and easily brought into exact apposition, and the tissues being but slightly damaged should, under favourable conditions, heal by the first intention.

In the treatment to be adopted it will be necessary, in the first place, to arrest hæmorrhage by one or another of the methods referred to under that head. Then with sharp scissors the hair is removed close to the skin, or, if possible, shaved for a considerable distance round about the wound, and the skin thoroughly washed with soap and Lister's "Strong Mixture", consisting of a 5-per-cent solution of carbolic acid and ·2 per cent (1 in 500) of corrosive sublimate. Brushing at the same time with a pretty strong nail-brush will assist in rendering the cleansing efficient.

The soap should then be washed off with the antiseptic solution, and all adhering blood removed from the wound, together with any foreign matter that may have entered it. This will be done at first with the fingers — picking off any tangible particles, and then by flooding the wound with a 5-per-cent solution of carbolic lotion. The two surfaces of the wound are now brought together, and this must be understood

to mean the entire surfaces of the divided parts, and not merely the outer edges or lips; for unless perfect coaptation of the more deeply seated parts is effected, any serum which may exude from the divided surfaces will gravitate to the bottom, and by increasing in amount tend to force the parts asunder and prevent healing; besides which it serves as a breeding-ground for micro-organisms should the wound prove not to be aseptic.

When the wound is of no considerable depth, but little difficulty will be experienced in effecting complete apposition of the divided structures; but in dealing with deep wounds special care and special methods of retention will require to be resorted to. In either case, the edges of the wound must be brought together by silk, wire, or catgut suture (pp. 416, 417), interrupted or continuous, as may be deemed desirable, and after the hairless surface has been freely sponged with carbolic solution, the wound must receive its permanent antiseptic dressing. Of the various substances employed for this purpose, the double cyanide of mercury and zinc gauze introduced by Lord Lister some years ago is regarded by our best surgeons as the most efficient and reliable. Before being used, it is wrung out in, or moistened with, a solution of carbolic acid (1 in 40) or corrosive sublimate (1 in 4000), and then applied over the wound, and for some distance around it. In this connection it should be pointed out that merely to cover the wound itself is to run great risk of failure by exposing it to attack from organisms which may obtain access from without, and defeat the object in view. Over this first layer of gauze four, five, or six others are placed, and these are covered by a thick layer of sterilized wool. Where practicable, a light bandage should be applied on the whole, so as to bring slight pressure to bear in maintaining complete apposition of the divided parts.

Fig. 412.—Drainage-Tube

In deep incised wounds gravitation of blood and serosity to the more depending parts, leading to the formation of a cavity or pocket, and hindrance to healing, may take place, and will require to be provided against. This may be done in some cases by the careful application of pressure through the dressing, in others deep stitches will require to be inserted in order to bring the deeper parts of the wound into apposition, or a drainage-tube (fig. 412) must be inserted for a short time to allow for escape of any matter which may exude.

If the wound has been rendered aseptic and protected from subsequent disturbance and contamination, complete healing should be effected in from ten to fourteen days, when the dressing may be removed and

the stitches withdrawn. Movement of the part, however, must be restricted for another week or ten days to allow of the union being perfected.

It must, however, be understood that the prospect of wounds in a horse healing by the first intention, even when made by the knife of the surgeon, is seriously interfered with by the dirty surroundings of the patient, the casual and imperfect after-attention he receives, and the difficulty in restricting movement of the part. These are so many obstacles to success which can only be overcome in exceptional cases. It results, therefore, that, however desirable it may be to bring about this mode of healing, the veterinary surgeon has in the main to rely on the more prolonged and tedious process of granulation.

Again, it is seldom that casualties of this kind are brought under his notice until many hours, or even days, have passed since their occurrence; and further, the implements by which wounds in horses are inflicted are mostly of the dirtiest possible description, being frequently covered with dust, decomposing filth, or earth, in which the bacillus of tetanus too often lurks. Moreover, the hair and skin through which they pass are more or less soiled and laden with bacteria. The advantages therefore offered even by an incised wound are largely discounted at the outset by these unfavourable conditions.

If, after being set up and dressed in the manner prescribed, the wound should show signs of soreness and pus formation, the dressing must be removed, and escape of the pus provided for by the insertion of a drainage-tube into the most depending part. The wound should then be redressed daily as before, until pus formation ceases. Should this not be accomplished, all the stitches must be removed, the wound laid open, and washed well with carbolic solution (1 in 20). Then the surface must be sponged over with undiluted liquefied carbolic acid, and the wound stuffed with the double cyanide gauze sprinkled with iodoform. This dressing should be changed daily, and the skin around the wound must be cleansed and disinfected at the same time with the 5-per-cent carbolic lotion.

In large wounds thus dealt with, the lips must be supported, either by bandages or by sutures, in the position most favourable to healing.

Lacerated Wounds.—This variety of wound is usually inflicted by blunt instruments, such as hooks, nails, pieces of iron or wood, which are forcibly driven into the flesh. Lacerated wounds in the horse are commonly associated with more or less severe bruising or contusion of the divided parts, which seriously complicates and retards the healing process. Moreover, the surfaces and edges of the wound are so irregular that they cannot be brought together with that perfect coaptation so

ARAB STALLION, MESAOUD

Sire, Aziz, bred by Ali Pasha Sherif; dam, Yemama, bred by Ali Pasha Sherif. A great Prize-winner and successful Sire
The Property of Wilfrid Scawen Blunt, Esq.

favourable to the healing of incised wounds. In some instances long shreds of fibrous tissue, being parts of tendons or fascia, hang from the torn surface of lacerated wounds, and if left to slough, as they frequently are, materially interfere with and delay healing. The desirability or otherwise of removing them at once, will be a question for consideration before proceeding to repair the damage.

When the injury is inflicted by stakes from hedges, or pieces of wood from fences, or other sources, some parts of these are frequently broken off and left in the wound. It is important, therefore, that careful search be made at the outset for any foreign body which may remain embedded in the flesh, with a view to its removal. Thorough cleansing and disinfection must follow preparatory to dressing, somewhat on the lines laid down in connection with incised wounds. But since the torn tissues are more likely to enclose and retain organisms, gentle brushing with a soft nail-brush should be resorted to. When all dirt has been removed, the surface of the wound should be sponged over with liquefied carbolic acid in an undiluted state. In those cases where, in consequence of the depth of the wound, certain parts of its surface are not accessible, a solution of carbolic acid (1 in 20) may be injected into the recesses which cannot be otherwise dealt with. As in these cases healing by granulation is the most we can hope for, everything should be done to protect the wound from organisms and neutralize the products of such as may gain access to it. To this end the wound should be sprinkled with iodoform, and then stuffed with double cyanide gauze, and the whole covered in with a thick layer of antiseptic wool.

This dressing must be applied every day, and the surrounding skin thoroughly cleansed and freely dressed with carbolic lotion (1 in 20).

The treatment for **Contused Wounds** is the same as that for Lacerated Wounds.

Punctured Wounds.—Punctured wounds result when sharp-pointed instruments, such as forks, nails, pieces of wire, splinters of wood, &c., enter the flesh.

The danger attaching to them will be in proportion as they are deep, and as they enter one or another of the various cavities of the body, or lay open vessels or divide nerves, or as the instruments by which they are inflicted are clean or dirty.

The horse is specially liable to this variety of wound in connection with the feet, either as the result of nails being driven into the quick in the act of shoeing or being trodden upon during progression.

In whatever way they are produced there is always more or less danger connected with them, on account of the introduction into them

of foreign matter of a septic character, which poisons the wound and may set up serious local and constitutional mischief.

Punctured wounds frequently escape attention, until acute swelling and the formation of abscess bring them into notice. When, however, they are known to exist, such results may frequently be guarded against by prompt and proper treatment.

In this connection the extent, direction, and relations of the wound should first be determined, if possible, by means of a small aseptic probe carefully applied. While this is being done it should be specially noted whether any foreign body has been left in the wound or not.

Where it is practicable, punctured wounds should be syringed out with carbolic lotion (1:20). If matter accumulates, a counter-opening must be made at the most depending part to allow of its escape, or they should be laid freely open and treated as a common wound.

In dealing with punctured feet the horn is usually stained a dark colour in the track of the nail, and a dark serous fluid escapes, or may be pressed from the orifice.

All the horn along the course of the puncture should be removed down to the quick, and any part of the horny sole which may be found to be detached from the sensitive sole must be removed. Being a non-vascular structure it cannot again reunite, and may afford lodgment to foreign matter and become a means of keeping up irritation in the part.

After being freely laid open, the wound must be irrigated with carbolic lotion and covered with a thick layer of antiseptic wool sprinkled with iodoform. The shoe should then be lightly tacked on, and the dressing supported by strips of cane passed across the foot and secured between the shoe and the crust.

Where these wounds receive prompt attention, six or seven days suffice to effect reparation. If neglected, the pent-up matter will force its way upward towards the coronet and break through the skin, giving rise to quittor.

After the dressing has been applied, the foot should be put into a "boot" to protect the wound from dirt, or if necessary a carbolized poultice may be applied over it.

Poisoned Wounds are for the most part due to one or another of the various micro-organisms which gain an entrance to them. In addition there are the stings of insects, such as bees and wasps, which sometimes attack our horses, and produce serious mischief. In these cases the stings must he removed, as far as possible, and the part dressed with ammonia.

Snake-bites, which happily are of rare occurrence in this country, are occasioned by the introduction of a secretion formed in the fangs of the

teeth of the snake, and injected into the tissues in the act of biting. Except in the Common Adder (*Pelias berus*) we have no venomous reptiles in this country, and the poison from this creature is comparatively feeble and harmless. In snake-bites, treatment, to be effective, must be prompt; a ligature should be tied tightly round the part, above the wound, which should be laid open and encouraged to bleed freely; excision of the bitten part, and the application of lunar caustic, or the actual cautery may also be resorted to.

DISINFECTION OF INSTRUMENTS AND APPLIANCES

As we have already pointed out, bacteria and their products are not only obstacles to the healing process, but the active causes of the diseases incidental to it. It is desirable, therefore, that everything brought into contact with the wound in the way of treatment should be rendered free from these offending organisms.

Sponges, cloths, and brushes, instruments, and sutures, as well as the hands of the operator, should each and all be dealt with antiseptically before being brought into use.

Sponges in their ordinary condition teem with bacteria of various kinds, and unless rendered thoroughly aseptic, may prove a fruitful source of mischief. Before being employed for surgical purposes they should be well washed out in soap and water, and then transferred to a fairly strong solution of soda, and after soaking in this for a couple of hours they should be wrung out in cold water, and kept immersed in a 1-in-20 solution of carbolic acid for four or five days or until required. Immediately before use they should be rinsed in a 1-in-2000 sublimate solution, or 1-in-40 carbolic lotion.

Where sponges so treated are not accessible, pads of absorbent wool steeped in carbolic or sublimate solution may be substituted. By some practitioners these are preferred, and generally employed, for the reason that after use they can be thrown away, and thus the trouble and risk of infection by sponges are averted.

Whether sponges or swabs of wool are used, the act of cleansing should always be carried out by wiping the skin in the direction away from the wound, and neither the one nor the other should be allowed to touch the latter until again soaked in the disinfectant.

Cloths and towels used for the hands and other purposes require to be soaked for three or four hours in a solution of carbolic acid (1 in 20), and all instruments employed in the operation must be similarly dealt with.

Ligatures and sutures of catgut should be soaked in carbolic solution

of the strength last referred to for four or five days, and silk should be treated in the same way, after first being boiled for twenty or thirty minutes. By the adoption of this course, suppuration in the track of the stitches is guarded against, and healing is facilitated.

SUTURES OR STITCHES

Various kinds of sutures are employed for bringing together and securing the edges of wounds during healing. The materials used for this purpose are chiefly flexible wire, cat-gut, silk, horse-hair, and silk-worm gut.

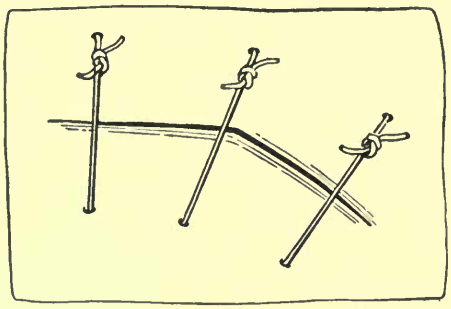

Fig. 413.—Interrupted or Simple Suture

Sutures are either interrupted or continuous. The interrupted variety is perhaps the most commonly employed in veterinary practice, and too frequently without due regard to the nature of the wound and the prospect of speedy union.

Interrupted or Simple Sutures are used more especially for wounds of irregular shape, or situated in positions difficult of access or in which there is tension. They are formed by threads passed from side to side through the lips of the wound and separately tied. Fig. 413 gives an example of this suture, showing the knot as it should be, lying well to one side of the incision.

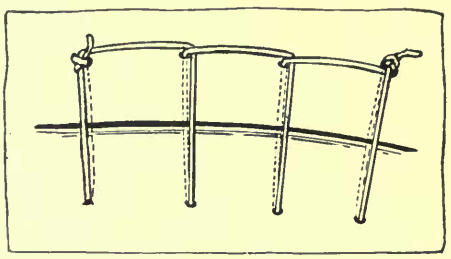

Fig. 414.—Continuous Suture

Uninterrupted or Continuous Suture. — This form of suture is employed where the wound or incision is superficial though extensive. The blanket or button-hole stitch (fig. 414) is the one most to be preferred. The stitch is commenced at one extremity of the wound, and after the needle has been passed through the two lips it " is then carried under the slack of the thread, so that the loop of each stitch after being tightened shall be at right angles to the edge of the wound, while the portion intervening between the stitches is parallel to it". To fasten it off, the needle is passed in the opposite direction through the edges of the incision, and tied as shown in the diagram. In the employment of continuous sutures care should be taken that the edges are perfectly coapted, and that no puckering or wrinkling result from it.

The Twisted Suture.—This variety of suture is much employed in veterinary surgery, especially in connection with short superficial wounds. It is formed by inserting two or more pins or needles, or other suitable material, through the lips of the incision. The pins should be placed at equal distances apart of not less than half to three-quarters of an inch, and

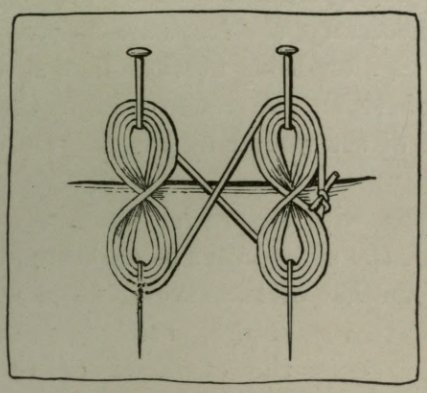

Fig. 415.—Twisted Suture

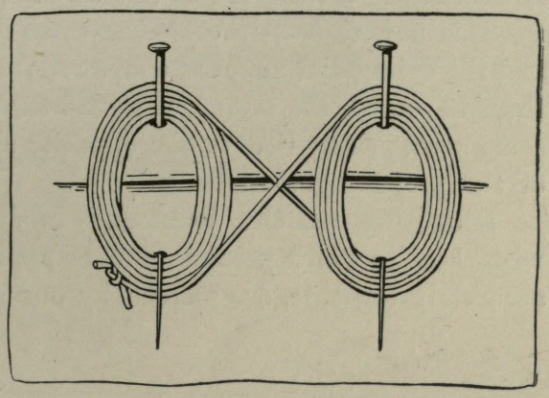

Fig. 416.—Circular-twist Suture

should be made to enter the skin from half an inch to an inch from one of its edges, and to reappear at the same distance from the other on the opposite side.

The requisite number of pins having been introduced, a piece of silk, catgut, or some soft thick thread or other material should be twisted around each one of them in the form of the figure 8 (fig. 415), or it may be made to describe the circular twist (fig. 416). In carrying the suture from one pin to the other, the crossing of the thread should be made to lie over the line of the wound as shown in the diagrams.

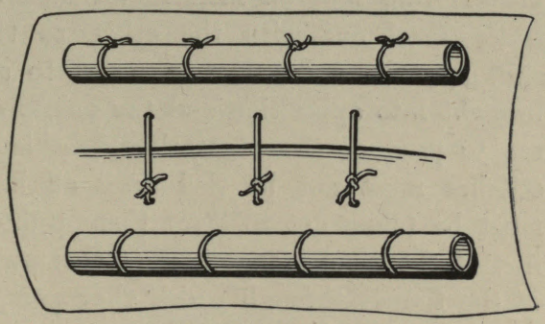

Fig. 417.—Quilled Suture

The Quilled Suture (fig. 417) is employed in the adjustment of deep wounds, the surfaces of which it maintains in apposition, while the edges are brought together by additional sutures of wire, silk, or other material.

The quilled suture consists of a series of interrupted sutures tied on either side of the wound to a quill, stout pencil, or some other and stronger cylindrical substance, according to the amount of support the divided parts may require.

The introduction of the quilled suture is best effected by means of a curved needle with an eye towards the point (fig. 418). This, on being armed with a double thread of the material employed, is passed through the lips of the wound from side to side. The looped end is then seized with the left hand and retained on one side of the wound, while the needle is withdrawn, leaving the double thread projecting from the other side.

This having been repeated as often as necessary, the loops are twisted, and the cylindrical material above referred to, after being notched here and there to receive the thread, is passed through them. A second piece of the same substance is tied to the opposite side of the wound by the free ends of the projecting threads.

Stitching up the Wound.—In dealing with superficial wounds, or with those to which pressure may be applied, the edges, after being brought accurately together, are secured by one or another of the several forms of suture, according to the character of the wound.

Fig. 418.—Curved Suture Needle with Eye at Point

It is important in inserting stitches that they be made to take a good hold, to guard against tearing out. For this purpose they should be passed through the skin at least half an inch from the wound on one side, and brought out a similar distance from it on the other. If interrupted stitches are used they must be placed from half an inch to an inch apart. The edges must be perfectly level one with the other, so that folding or puckering of the skin may be avoided. In order to assure this, the edges should be brought into apposition and the points marked through which the sutures are to pass, or the edges should be held together by an assistant. The stitches must not be tied until all have been inserted, and then care must be taken not to draw them tighter than is necessary to bring the lips of the wound together. Overdrawn sutures obstruct the circulation of the tissues through which they pass, and excite irritation in the part, and interfere with the healing process.

Where a bandage can be applied over the dressing, its employment is most desirable, and in some cases it is indispensable to a speedy reunion of the wound. By careful adjustment it should be made to exercise gentle and uniform pressure on the divided parts, and by so doing keep them in close apposition, thereby preventing the accumulation of effused fluid, and favouring the healing by the first intention.

In those cases where bandages cannot be applied with effect, and especially in the case of large wounds inflicted on parts of the body where

the detached skin and flesh has a tendency to become displaced by its own weight, deep stitches of stout flexible wire or catgut should be inserted (stitches of relaxation) at some distance from the edges of the wound, in order to remove any strain or undue tension from those uniting the edges of the wound (stitches of coaptation).

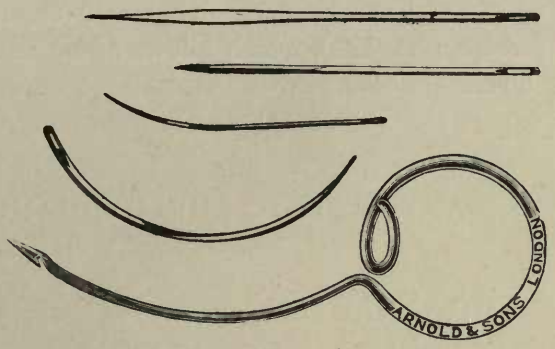

Fig. 419.—Various Patterns of Suture Needles

Plasters.—There are many wounds in the horse which do not admit of being bandaged, and difficulty is experienced in maintaining antiseptic dressings in position. In some of these cases strong plasters may be found to answer the purpose. Thin strips of leather smeared on one side with shoemakers' wax, strong glue, or some other adhesive composition may be made to secure them.

Where plasters are employed the patient should be tied up in such a way as to prevent them being rubbed off.

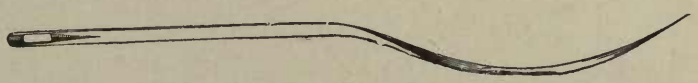

Fig. 420.—Suture Needle, French Pattern

Fig. 421.—Suture Needle, grooved, for Wire

Fig. 422.—Suture Needle with Screw Spring Eye for Wire

Fig. 423.—Wire-cutting Forceps and Needle-Holder

Needles of various forms and sizes are employed for the insertion of sutures. Of these some are straight, others curved, either throughout their length or towards the point (fig. 419). The point of the needle is in some cases round, in others flat, and in others again triangular. An eye for the reception of the thread exists at one extremity, and for some purposes also at the other. When an eye occurs at the point, the needle should be grooved to let in the thread and facilitate its passage through the flesh.

A special form of needle is provided for metallic sutures; on either side of the end of the needle proceeding backward from the eye is a groove into

which the wire is pressed after it has been threaded (fig. 421), or the end of the wire is in other examples passed into a hole at the end of the needle (fig. 422).

Difficulty is sometimes experienced in forcing needles through the skin or other hard tissues. This is overcome by the employment of suture forceps (fig. 423), which allows of additional pressure being exercised upon the needle, and guards against that tendency to slip which occurs when the fingers alone are employed.

ANTISEPTICS EMPLOYED IN THE TREATMENT OF WOUNDS

"**Carbolic Acid,** the first antiseptic introduced by Lister, has a direct germicidal action in strong solutions and an inhibitory effect in weaker ones. The crystals when heated with 10 per cent of water constitute an oily fluid known as pure or liquefied carbolic acid, which is a powerful though superficial caustic, and may be employed without much fear to infected lesions, in order, if possible, to sterilize them. Thus it is always well to treat tuberculous wounds with this fluid after scraping them, in order to destroy any portions of tuberculous material which may have escaped the spoon. The liquid carbolic dissolves in water on the application of a little warmth, and the 1-in-20 and 1-in-40 solutions are those mainly employed; the former is an efficient and potent antiseptic, and must be used carefully on delicate skins. Carbolic acid is frequently somewhat crude and impure, and many of the irritative and toxic phenomena are due to cresylic acid and other substances which should not be present. General absorption of this reagent leads to darkening of the urine, which may become olive-green or even black in colour, and this carboluria is often associated with a rise in temperature and some intestinal irritation, whilst diseased kidneys may be seriously affected. It is more likely to occur when weaker solutions are employed than when the liquefied or pure acid is applied. The latter is seldom absorbed."

"**Corrosive Sublimate** is a valuable though very poisonous remedy which is usually employed in solutions of 1 in 2000, 1 in 1000, or 1 in 500. Occasionally the last of these three solutions has 5 per cent of carbolic acid added to it, constituting what is known as Lister's strong mixture. Sublimate solutions are inhibitory in action rather than germicidal, but are potent and reliable. They have less power of penetration than carbolic acid, but have no hardening or roughening influence on the skin. If, however, a dressing soaked in a sublimate solution (1 in 2000) is kept for long in contact with the skin, it acts as a direct irritant, and may lead to an

abundant formation of pustules, owing to the activity of the germs in the deeper parts of the cutis which have not been destroyed by the antiseptic. Instruments should not be placed in sublimate solutions, as, even if plated, they soon lose their bright appearance."

"**Biniodide of Mercury** is a potent antiseptic which has been chiefly employed in the form of a 1-in-500 solution in 70 per cent methylated spirit for the purification of the hands or of the skin of the patient."

"**Boric or Boracic Acid** is a mild and weak antiseptic which may be utilized when stronger remedies might prove harmful, *e.g.* in plastic operations. It is also useful when antiseptic fomentations are required in treating inflammatory phenomena."

"**Iodoform** is a yellow powder of characteristic and unpleasant odour, which probably acts by being decomposed in the tissues and slowly giving off iodine. Commercial iodoform is usually contaminated with a variety of germs, as may be shown by dusting it over a film of nutrient gelatine and allowing them to develop. It is, therefore, wise to wash the iodoform before use in 1-in-20 carbolic lotion or some such antiseptic. Its chief value is in septic or tuberculous wounds, and indeed it seems to have a specific inhibitory action upon the development of the bacillus of tuberculosis. It may be suspended in glycerine (10 per cent), and, after sterilization by heat, injected into tuberculous tissues, joints, or abscesses, or if open wounds exist, gauze soaked in this emulsion, as it is incorrectly termed, may be packed into them with advantage."

"**Chinosol** is a yellow substance harmless and free from toxic qualities. It is freely soluble in water, and possesses powerful antiseptic properties."

"**Lysol** is another useful antiseptic derivative of coal-tar. It is freely soluble in water, and, as a 2-per-cent solution, may be used in syringing out cavities such as the vagina, external ear, &c. One of its great advantages is that the solution is somewhat sticky, and tends to cling to the tissues and prolong its action."

"**Permanganate of Potash and Peroxide of Hydrogen** both act in the same way as oxidizing agents. They are necessarily unstable, and cannot be utilized for dressing, and are therefore chiefly employed in the disinfection of cavities or wounds already contaminated. The most potent of these is peroxide of hydrogen, which is sold as a fluid capable of setting free ten or twenty times its volume of nascent oxygen. It is quite unirritating, and may be poured directly into a septic wound or even into the peritoneal cavity; forthwith it commences to effervesce, liberating its oxygen and forming a frothy foam which is likely to bring to the surface any loose foreign bodies. Its use is particularly indicated in the treatment of septic ulcers, carbuncles, sloughy abscess cavities, and the like. Per-

manganate of potash is used in solutions of varying strength, and acts more slowly. It has the disadvantage of staining the tissues with which it is brought in contact."—*Rose & Carless.*

BROKEN KNEES

The knee is said to be "broken" when the skin is cut partially or completely through. In the former case it may be of little moment, but in the latter it is always more or less serious, for in addition to the skin, important structures beneath may suffer more or less injury at the same time. The sheaths of the tendons may be opened, the tendons themselves may be lacerated or even divided, the bones may be bruised, or the joint may be contused and punctured.

Causes.—Forcible contact with the ground as the result of stumbling is the immediate cause of broken knee. Horses stumble for many and various reasons. Of these, some have reference to conformation and condition, others to weakness, want of energy, or disease, while not a few are the outcome of bad shoeing and neglected feet. Horses with upright pasterns whose toes are turned out, and others with narrow chests whose action is close, are more or less addicted to stumbling, as are also animals with heavy heads and fleshy, ill-carried necks. Want of condition and a natural deficiency of nervous energy likewise conduce to it. Diseases of the feet, especially navicular disease and corns, are often the precursors of broken knees. Animals addicted to brushing or speedy cutting are also rendered liable to fall. Disproportion in the thickness of the shoes, as when they are unduly high at the heel or the toe, may also lead to stumbling.

Symptoms.—A broken knee is a very patent defect, but the severity and serious nature of the injury can only be determined by a careful examination of the injured part. The skin may not be completely divided, although the wound is considerable in extent. The lesion, on the other hand, may be comparatively small, but may extend deep down towards or into the joint. In other instances the joint escapes injury altogether, but the tendons beneath the skin are seriously contused and torn, and their sheaths are laid open.

The amount of lameness present will, of course, depend upon the extent of the injury and the structures involved. A mere skin wound rarely occasions more than a slight stiffness, but any implication of the joint is attended with great pain and disablement, as well as a good deal of general systemic disturbance, and in a less degree the same may be said of injuries affecting the tendons. In injuries to the joint the leg is rested on the toe,

and the animal declines to impose weight on the affected limb. Passive movement of the knee occasions considerable pain, and should the joint be opened the wound discharges a yellowish, transparent, glairy fluid, which later on coagulates over the orifice in the joint into a soft jelly-like substance. A considerable amount of swelling invariably results when the articulation is injured, and the patient seldom escapes without more or less permanent enlargement or stiffness of the injured joint.

Treatment.—A clean stable is the first requirement of animals suffering from wounds. This provided, the part must be thoroughly cleansed from all dirt by means of warm carbolized water. It should then be carefully probed to determine its depth and the structures injured, and to discover and remove any grit or other foreign matter that may exist in it. Should it be found that the joint is implicated, the patient should be put into slings. The wound should then be prepared and freely dressed with a solution of carbolic acid and covered with a thick pad of absorbent wool, and secured by a clean flannel bandage. Both the wool and the bandage should be well baked before being used. The dressing will require to be renewed morning and evening for the first two days. Afterwards the renewal will only require to be made once daily. The patient should receive a mild dose of physic, and be placed on a light diet, including a liberal allowance of green meat or roots.

If the tendons are torn, as they sometimes are, the loose shreds must be carefully removed close up to the body of the tendon by means of suitable scissors. In slighter injuries of the knee the horse may be put on the pillar reins, and prevented from lying down, while the wounds are dressed as prescribed.

When bruising of the parts is very extensive and swelling considerable, bandages well wrung out in hot water may be applied over the dressing for two or three hours after the accident, and repeated if necessary. Where the wound in the knee has been considerable, the parts should be allowed to undergo complete repair before the patient is allowed to lie down, or the uniting structures may be forced apart, and the wound again laid open.

CRACKED HEELS

By cracked heel is understood a crack or breach in the skin of the heel. It is to all intents and purposes a wound, but owing to its peculiar position it requires to be specially considered. Wounds of the skin are not as a rule difficult to deal with; but when they occur in parts of the body where movement is constantly going on, the healing process is always more or less delayed, and sometimes rendered difficult to effect.

Cracks in the heel almost invariably run crossways, sometimes extending from one side of the heel to the other, at others being much shorter, when they are situated to the inner or the outer side of the heel just below the fetlocks; or a crack may occur in both positions, or it may be placed lower down in or towards the hollow of the heel.

Hind-legs and fore-legs alike are subject to this affection, but it is more common in the former than the latter. This difference is probably due to the facts: (1) that the hind-legs are farther from the centre of circulation than the fore ones, and therefore more liable to aggravated attacks of congestion and inflammation of the heels; (2) that in badly-regulated stables they are more exposed to moisture and filth, conditions which contribute so much to the production of the disease.

Causes.—In large numbers of cases predisposing influences play an important part in the cause of cracked heels. In this connection it is noticed that horses of lymphatic temperament, whose limbs are prone to swell from slight disturbing causes, are specially liable to the disease.

Animals in whom the circulation is enfeebled by age or poverty, and others of a plethoric habit of body, are equally susceptible.

The exciting causes of cracked heels are such as produce inflammation of the skin, hence it follows upon injuries done by ropes in casting either for operations, or by accident in the stables, and as the result of an extension of inflammation from the foot in certain forms of disease and accident.

The most common exciting cause, however, is the repeated exposure of the heels to wet and snow during the prevalence of biting easterly winds. Snow when mixed with salt and dirt, as sometimes encountered on the streets of our large towns, is a common inducing cause of inflammation and cracking of the skin of the heels. The disease is also produced by washing the legs in cold weather and leaving them exposed to dry.

The action of cold and wet in the induction of cracked heels may be stated as follows:—Cold, whether it is produced by cold air or the rapid evaporation of water, causes the blood-vessels of the skin to contract, and the quantity of blood circulating in the part is consequently reduced. If the application be continued for a lengthened period, or made repeatedly at short intervals, as when a horse's legs are allowed to become wet again and again and to dry under the influence of cold winds, the contracting power of the vessels is gradually reduced, and sooner or later becomes for the time being exhausted. As a result of this, the pressure of the blood within the vessels begins to assert itself and to overcome their resistance.

A reaction now sets in, and the vessels which have been caused to contract under the influence of cold open out and become widely dilated and at the same time morbidly distended with blood. This state of things

continuing, results in inflammation, when the skin, before cool, now becomes red, swollen, hot, and tender. At the same time moisture oozes through the surface, and the tissues having lost their cohesion, split across in consequence of the frequent bending of the joint.

Cracked heels are invariably attended with more or less lameness. In progression, and especially at starting, the legs are raised some distance from the ground, and are sometimes sharply caught up and suspended in the air. The limb about the fetlock-joint, and maybe as high as the knee or hock, is swollen and more or less painful to the touch. A discharge of a sticky and sometimes of an offensive character flows from the wound, and the horse stands with the fetlock-joint in a semi-flexed condition.

Treatment.—The objects of treatment will be to subdue existing inflammation and bring about healing of the wound. The first of these indications will be best accomplished by the prompt administration of a dose of physic; at the same time the diet should be carefully regulated, and consist for the most part of bran and a little crushed corn. After the physic has ceased to operate, a little green food, carrots, or other roots should be supplied morning and evening.

In the matter of local treatment, a poultice of linseed-meal or boiled carrots should be placed on the heel and secured by a long flannel bandage wound round the leg as high as the knee. The bandage should be so adjusted that the pastern cannot be flexed, or the lips of the wound will be repeatedly drawn apart during movement, and healing thereby delayed.

The poultice should be changed not less than three times daily, as when allowed to get foul it tends to irritate rather than soothe.

When the inflammation has subsided, the wound should be dressed two or three times a day with some antiseptic powder or solution, and covered by a pledget of cotton-wool and secured by a bandage as before. As soon as may be, the wool and bandage should be discontinued, and the part kept freely dusted over with a powder composed at first of boracic acid and flour or prepared chalk, to which a little alum may be added later. Where, as is sometimes the case, the edges of the wound become callous and refuse to heal, a little caustic must be freely applied to them, so as to excite a fresh granulating or healing surface.

When the wound has healed, and the skin resumes its normal condition, it should be carefully guarded against undue exposure to wet and dirt, as a return of the mischief may be easily provoked by these means.

ULCERS

There are two varieties of ulcers as properly understood, viz. the simple or common ulcer and the specific or infective. The former is due to some local derangement of nutrition, the consequence of impaired circulation or innervation of the parts. The latter results from the action of specific organisms which have gained access to the body. The non-infective ulcer assumes a variety of forms, of which the following are of special interest to the veterinarian and the horse-owner.

The Simple Ulcer is a sore in which the process of healing has been arrested and followed by a more or less rapid extension of the wound. A number of causes may be individually or collectively concerned in bringing about this retrograde action. Among them the chief are mechanical irritation, as the chafing of a collar or a saddle, or any other part of the harness; undue movement of the injured part, such as occurs when the wound is situated on the aspect of flexion or extension of a joint, or over the seat of much-used muscles. It may also be induced by pressure.

Ulcers of this kind are covered with yellowish-red granulations, which are usually flush with the margin of the skin, and the edges are but slightly if at all thickened.

When severely irritated, acute inflammation is excited in these ulcers, and the surrounding skin becomes thickened by serous infiltration; there is also great soreness, and a free discharge of pus from the surface. The edges of the wound now present a somewhat irregular and sloughy appearance.

The Indolent or Callous Ulcer.—The callous ulcer is most frequently found on the shoulders and backs of old horses as the result of ill-fitting collars and saddles, or on the withers, or in the heels. It is usually preceded by a succession of abrasions, during which the skin and subcutaneous tissues become infiltrated and thickened, and the vessels surrounded and compressed by a contracting undergrowth. As a consequence the blood-supply to the part is diminished, its vitality is weakened, and the skin is predisposed to ulcerate.

The callous ulcer is more or less hollowed and like a saucer. The edges are thickened, and raised above the general surface, which is usually smooth, and of a pale-yellowish colour. It discharges a small quantity of thin, sero-purulent fluid, and shows little or no disposition to throw up granulations. The skin round and about the wound, and the tissue beneath it, are hard and thickened, and firmly adherent to the underlying parts.

Weak Ulcers.—"The simple ulcer or the healing sore is very apt to become a weak ulcer as the result of defective blood-supply, either from too small a quantity of blood being sent to the part, as in cases where the vessels are diseased, or from deficient quality of blood, for example, during the progress of some constitutional disease. In this form of ulcer the granulations become smooth and somewhat yellowish, the secretion thin and small in amount, and very apt to scab, and the edges pale and flat. In other cases of weak ulcer the granulations become œdematous, and this is more especially the case where there is some general cause of œdema or some local interference with the circulation, such as compression of veins from the contraction of the sore, &c. Or again, we have another form of weak ulcer, where the granulations show excessive growth. This is chiefly the case where the ulceration is due to inability of the sore to contract. In such cases the granulations become prominent, vascular, soft, and bleed readily, and we have the condition which is popularly spoken of as 'proud flesh'.

"These simple ulcers again may become attacked with some septic virus which leads to what is called the phagedænic ulcer. In the latter case the ulcer becomes covered with grayish pulpy material, which rapidly infiltrates the surrounding skin and cellular tissue, and extends both superficially and deeply at the bottom of the sore, leading to extensive and very rapid destruction of the part, and not uncommonly to the death of the patient."—*Watson Cheyne.*

Treatment.—In the treatment of ulcers, as in the treatment of wounds, it is desirable to remove all causes of irritation, and especially the septic discharge with which they are usually covered. In this connection the antiseptic method applied to wounds must be resorted to here. The hair must be removed from around the ulcer, and the skin cleansed and rendered aseptic. The ulcer must then be disinfected. This may be accomplished either by the application of a solution of chloride of zinc (40 grains to the ounce), or by touching the surface with nitrate of silver, or by scraping away the septic granulations and subsequently applying undiluted carbolic acid. Following this, the wound should be dressed every day with boracic-acid ointment, half strength, and covered with three or four layers of boracic-acid lint. In some cases of callous ulcer, gentle pressure will be found of service where bandages can be applied, or a mild blister to the edges of the wound may hasten the healing process. In long-standing cases, the actual cautery may be lightly applied to the surface of the sore with good result, followed by the application of boric-acid dressings.

Specific Infective Ulcers are the result of the action of pathogenic

or disease-producing bacteria. The more common examples in the horse are seen in that form of glanders termed farcy. Recently a contagious form of lymphangitis has been introduced into this country from South Africa, in which specific ulceration of the skin is a leading feature of the affection.

Maladie du Coit, a venereal disease prevailing on the Continent and but seldom seen in this country, offers another example of this class of ulcer.

For particulars of these ailments, refer to them under their respective headings.

SINUS AND FISTULA

These are narrow, more or less elongated wounds, opening on to the surface by a small orifice.

Sinuses usually communicate with an abscess, and are the channels by which pus makes its escape.

Where injury occurs to muscles, bones, or other structures, resulting in suppuration, the prospect of healing after the matter has been evacuated will greatly depend upon the extent to which motion can be restricted. Where the part is in continued action, as occurs in the region of the poll, the pus has a tendency to burrow among the muscles, and to keep up the irritation and prevent healing; it is on this account that what is known as "poll evil" proves so abiding and intractable an ailment.

Sinus invariably follows the long confinement of matter when formed in the feet as the result of a prick; or it may arise from the lodgment of some foreign substance, as a splinter of wood, in the flesh; or from the too early closing of a wound before the deeper parts have healed; or from the presence of a piece of dead bone in the process of sloughing, or which has sloughed as the consequence of injury or disease.

The treatment of a sinus will, of course, depend upon the cause by which it was produced and is made to continue.

Where movement is the offending factor, means must be adopted to stop the action of the muscles as far as possible, and bring the part into a state of rest.

Confined pus must be evacuated either by laying the canal freely open along its entire length, or by making a counter-opening at the most depending part, and allowing free drainage. All partitions in the cavity to which the sinus may lead should be divided, and pockets made to communicate, to facilitate the escape of pus. Where foreign bodies exist, they must be removed before reparation can be hoped for.

The sinus, whether laid open or under-drained, should be dressed once or twice, at an interval of two days, with undiluted carbolic acid or a solution of chloride of zinc of the strength of 1 in 40, to be followed by the daily application of iodoform and a covering of gauze and antiseptic wool. Some practitioners plug old, obstinate sinuses with cotton-wool dressed with perchloride of mercury and arsenic, and allow the dressing to remain until the sinus is healed.

Sinuses of recent formation may be found to yield to strong boracic ointment and boracic lint as a dressing.

Fistula is an unnatural canal or wound with an opening at one extremity on the skin, and at the other into one or another of the various

Fig. 424.—Fistula of the Parotid Duct

cavities or conduits of the body; or it may extend between two cavities, as between the bladder and the vagina—vesico-vaginal fistula.

Thus a wound in the wall of the abdomen may communicate with some part of the intestine, or one in the cheek may have connection with the parotid duct (fig. 424), through which fæculent matter in the one case and saliva in the other may escape. It is the constant passage of these solids and fluids through the canal, and the impossibility of rendering them aseptic, which makes fistulous wounds so troublesome to heal.

Treatment in these cases must be directed towards arresting the outflow of the discharge and directing it into and along its proper channel. Sealing over the outer orifice with collodion is in some cases sufficient to bring about healing in fistula of parotid duct. In others the surface of the fistula must be brought into a healthy condition by antiseptic treatment to induce healing, or, if possible, laid freely open

and scraped, and treated as an ordinary wound. In some chronic cases the orifice has been caused to close by touching it lightly with the actual cautery.

FISTULOUS WOUNDS

POLL EVIL

This term signifies a wound on the poll, or that part of the neck immediately behind the ears. It usually consists of one or more sore places in the skin communicating by pipes (sinuses) with a cavity seated more or less deep down in the tissues, sometimes extending to the bones, the whole constituting what is termed a "fistula".

Causes.—It is caused by an injury, frequently inflicted by the horse striking his head against some hard substance, as a low beam, ceiling, or doorway, or against the floor or wall in the act of rolling, or by a violent blow with any hard substance, as a whip-stock, fork-handle, &c., bruising the skin and underlying structures so as to interfere with the circulation of the part. It has also been caused by stretching these parts by the injudicious use of the bearing-rein, and by badly-fitting or heavy bridles chafing the poll.

The **symptoms** at first depend a good deal upon the severity of the injury. If this be slight we may only find a small swelling on the nape of the neck, which soon passes away again after a short period of rest, even without any treatment at all. At others there is a small hard knot left, which upon the slightest injury—and with such a swelling injuries are easily inflicted—rapidly enlarges to the size of a cricket ball or more. This swelling is very painful to the touch, and causes the animal to carry his head in a stiff manner, with the nose slightly poked forward and upwards to relieve the tension of the muscle at the back of the neck. After a time —usually from one to three weeks—there appears a soft place on the swelling, which shows us that the part has gathered and formed matter (pus), which has found its way to the surface (pointed). If not opened it will soon burst through the skin and discharge a thin yellowish-red matter, which after a few hours changes to a yellowish-white colour.

When the matter is allowed to remain pent up in the tissues, it will burrow between the muscles in all directions, and occasion a wound with several pipes (sinuses), which proves, as a rule, a very formidable one to cure, particularly if the pax-wax or great ligament of the neck, or the bones below, become involved. The matter (pus) may run down the neck between the muscles—even as low as the shoulders, as we once had occasion to observe; or the neck bones (cervical vertebræ) may become diseased,

giving rise to death (necrosis) of the bones, or to their permanent enlargement and union with each other (anchylosis), producing a chronic stiff neck; or the ulceration may extend even to the spinal canal, causing pressure on the cord and consequent paralysis, or epileptic seizures, or sudden death. One or both sides of the neck may be affected.

The Treatment.—In the early stages, when the swelling is hot and tender, the treatment should consist of cold applications to the part, such as cold douches, which may be applied by fixing a hose-pipe to a tap, or by syringing two or three buckets of cold water over the poll three or four times daily with a garden syringe. Then apply linen cloths soaked in a solution of sal ammoniac and saltpetre in water. During this time the animal should be kept on bran mashes or other light food, and receive a dose of physic, to be followed by green foods in summer or roots in winter. Should this line of treatment not be successful in allaying the inflammation and reducing the swelling, we may be sure that it means to gather, particularly if it becomes more painful to the touch. As soon as we are satisfied that it is gathering (forming an abscess), we should encourage the process as much as possible, for the sooner we can get the matter to the surface the better. This is best effected by the application of hot-water fomentations and stimulating lotions. If the swelling does not seem inclined to "point" quickly, a smart blister to the most prominent part of it will usually hasten on the process. Directly the abscess "points" we should lose no time in opening it, and this should be done at the lowest part of the cavity, so that a natural drainage may be obtained and retention of the matter avoided. If this can only be properly done at this stage, we shall find very little difficulty in healing the breach,—*i.e.* when the great ligament of the neck and the bones are not affected.

If, however, as is usually the case, the wound is neglected at this stage, the matter (pus) begins to burrow between the muscles, forming pipes (sinuses) in various directions; these must be bottomed and laid freely open. There are various means of doing this. Some prefer the knife, but this, even in skilful hands, is not always successful, because the pipes run in such intricate and awkward directions that it is extremely difficult to follow them; others, again, use caustics, and destroy the pipes and the surrounding structures. There are several of these agents; one of the oldest, best, and perhaps the commonest, is corrosive sublimate. Arsenic is often used, but it requires great care; and even with the most discreet it will sometimes act far beyond their expectations, and damage or destroy neighbouring structures, which adds to the trouble of the case by causing delay, and may also prevent recovery. If the cautery has been successful, all that is required after is cleanliness and the application of some astringent and antiseptic

lotion, as carbolic acid. Occasionally, however, the healing process "hangs fire", as the old practitioners used to say, and then a stimulating lotion to encourage granulation is required.

Another line of treatment is to pass a piece of tape (seton) besmeared with some digestive ointment to the very bottom of the wound and bring it out again at a lower level. This is a very common and sometimes successful practice when both sides of the neck are affected, the tape being passed from one side to the other and allowed to remain until the wound has healed, leaving only the canal through which the tape passes, when it may be removed and the canal allowed to heal up.

When either the great ligament of the neck or the bone is diseased, it becomes a very formidable case, because both these structures have a slow circulation and little reparative material is brought to them. Then again, they are so deeply situated that it is difficult to get at them to cut away any diseased part. When, therefore, either of these structures is involved, we may be sure it will take a long time—even months—before a cure can be effected. Finally, we may say there is no hard-and-fast line of treatment in these cases, but each has to be taken on its own merits and treatment adopted accordingly.

Prevention.—It will be readily seen from the foregoing that poll evil may be prevented by having the stable doors and ceiling high enough to prevent the horse striking the top of its head, also having light and well-fitting bridles, and a kindly-disposed and attentive groom or horse-keeper, so that should any chafing occur he would give it immediate attention, and so ward off a most troublesome disease.

FISTULOUS WITHERS

This may be defined as a sinuous wound on the wither, or that part between the neck and back at the top of the shoulder-blade.

Causes.—These are similar to those of poll evil, viz. injuries, and are usually inflicted by the collar or saddle bruising the skin and tissues beneath, on the top, or at the side of the withers. It may be caused by the structures being pinched between the collar and a badly-fitting saddle.

A very common cause is the chafing produced by the edge of the rug, especially when it is fixed by a buckle or strap at the breast and the rug shifts back until its edge is drawn tight over the withers and chafes the skin at this part; or it may result from injury inflicted while rolling, or being cast in the stable, or from a bite from another horse.

The **symptoms** at first are usually a small swelling, which is rather sore and tense, on the top of the withers, or it may be to one side. If this

is neglected and the cause not removed, the skin will very soon be broken, and then matter (pus) is formed and oozes from it. When only the skin and the tissue immediately under it are affected, little trouble need be anticipated, but if the cause is not removed the deeper structures (muscle and fascia) and even the bones (vertebral spines) may become diseased. Horses that have very high withers, and those poor in flesh, are most liable to be chafed by ill-fitting harness. Animals also of the heavier

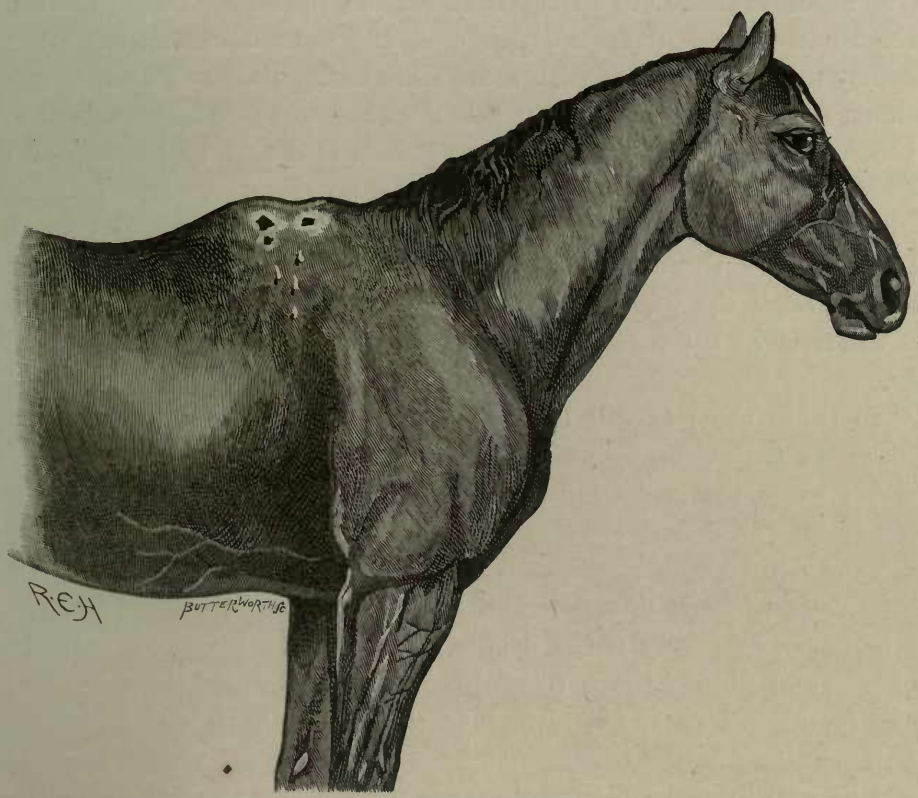

Fig. 425.—Fistulous Withers

class are more often affected, probably because the harness of such animals is not so carefully fitted, nor kept in such good condition, the loads are heavier, and the work much rougher than with those of the lighter breeds.

Frequently the bruise is so severe that matter forms (abscess), which after a time burrows amongst the muscles, and finally breaks out through the skin on one side of the wither. The matter is assisted in finding its way between the muscles by the movement of the parts during progression. In this way pipes (sinuses) are formed in various directions leading to the open wound at the surface.

The **treatment** consists in the first place of removing the irritant, whatever it may be, and keeping the animal as quiet as possible, to prevent

the muscles moving on each other. If the skin is not broken, and the swelling appears tense, hot, and painful, cold applications may be applied to try and reduce the inflammation and the swelling. These may be in the form of cold-water douches and cooling lotions applied by soaking linen cloths and placing them across the wither. If in the course of a few days the swelling does not disappear and the pain subside, but on the contrary continue to increase, we may expect that suppuration is taking place and that an abscess is about to form; that being so, the sooner we get the matter to the surface the better. To this end, hot water fomentations must be diligently applied, together with some stimulating liniment, such as that of ammonia and turpentine. When this does not succeed, a blister will often be beneficial. As soon as the swelling points, it should be lanced and well opened up to the lowest part of the cavity, so as to give free exit to the matter (pus) and allow of the removal of any dead tissues that may exist, and drainage of the abscess may be effected by passing a piece of tape (seton) through the wound, being careful to bring it out at a lower level than the floor of the cavity, so that no matter may be allowed to accumulate there.

Sometimes the pus will have burrowed behind the shoulder-blade, in which case a depending opening must be made or a seton passed through it. At other times the projections of the backbones (vertebral spines) will be diseased, in which case they must be freely scraped or removed by the veterinary surgeon.

Fistulous withers, like poll evil and quittor, are tedious cases at the best of times, especially if the deeper structures are involved, particularly the bones and fibrous tissue (fascia). In all cases where the diseased part can be found—which is not always an easy task—it is best to remove it with the knife. When this cannot be determined, the wound throughout should be well cauterized, with the hope of bringing away the injured and offending tissue. If this is not accomplished and the wound heals up on the outside, as it frequently will, a fresh abscess will form sooner or later, and the whole process will have to be gone through again; therefore it is useless to let the wound heal at the surface before the inside has grown up sound, or, in other words, the wound should be made to heal from the bottom. It is an old but sometimes successful practice to "plug" the sinus to the very bottom with some caustic, such as corrosive sublimate, or arsenic, or a mixture of the two. This destroys the tissues for some distance around, and frequently brings away the damaged structure that prevented healing in the first instance. When this happens the result is very satisfactory, because as soon as the dead part (slough) is removed, the wound at once begins to close, and only requires to be kept clean and

have antiseptic lotions applied at frequent intervals to ensure a cure. When the wound has healed, two or three weeks should be allowed to pass over before the animal is again put to work, so that the injured part may become thoroughly restored.

Prevention.—Always have well-padded and properly-fitting harness and clothing, and as soon as any sign of chafing occurs, at once remove the offending agent. In this way many tedious and painful wounds may be avoided.

FISTULOUS CORONET

This is treated of under the heading of "Quittor" on p. 378.

SORE SHOULDERS AND SHOULDER ABSCESSES

"Sore shoulders" is an expression which is applied to a variety of pathological conditions, from the most superficial abrasion to inflammation and abscess deeply seated in the structure of the part. It is almost exclusively confined to harness horses and others engaged in heavy draught, and for the reason, no doubt, that the collar they wear is the exciting cause of the malady. Young horses which are collared for the first time, horses with thin, delicate, and sensitive skin, and others on whose shoulders small fibrous tumours or eczematous eruptions appear, are most frequently the victims of sore shoulders.

Now and again animals with none of these predisposing conditions are made to suffer by violent irritation to the surface and contusion of the deep-seated tissues.

Collars that are ill-fitted, badly-formed, and imperfectly-stuffed, are the actual or inducing causes, and their mischievous effects are intensified by cold, wet weather, when the skin is chafed and chapped.

The more numerous and simple forms of the affection are mere abrasions. The cuticle is rubbed off, the sensitive skin is exposed and thickened by inflammatory swelling, and maybe the hair leaves its follicles. It is, besides, hot and sore, and when seen on a white horse there is more or less redness of the surface.

In this condition the application of the collar provokes pain, and the animal obstinately refuses to throw himself into it, and attempts to remove the pressure by backing. Young horses are frequently ill-used by ignorant grooms on account of this resistance to suffering, and from quiet, willing workers are converted into unmanageable and useless brutes.

The continuance of work after this primary chafing results in sores of greater or less extent and depth, with, in some cases, sloughing of the skin or the formation of superficial abscesses.

In some horses the skin on the site of the collar is studded with small tumours about the size of a bean or a marble, which are caused to enlarge by the constant chafing, and sooner or later to break into obstinate sores.

Eczematous and other eruptions in this situation are also soon converted into superficial wounds by the same means.

Now and again an inflammatory swelling appears, at first of limited extent, but gradually increasing in size over a period of weeks or months until it reaches the dimensions of a cricket ball or a moderate-sized turnip.

Its growth is slow, and may for some time be hardly perceptible. At first it does not seriously incommode the animal, but as it develops soreness increases, and the time sooner or later arrives when the collar cannot be borne. It commences as a hard, diffused fulness, which slowly spreads. After several weeks or months a fluctuating point appears on the surface, indicating the presence of an abscess, which in due course breaks and discharges its contents.

Treatment.—In all cases of sore shoulders, whatever its form may be, the cause should be removed. This will require that the use of the collar be discontinued, or substituted by a breast collar. Frequently this is all that will be necessary, but a dose of physic and a few days' rest will hasten recovery.

Where a local application is needed, the part should be well washed and dried, and then dusted over with a powder composed of boracic acid and flour twice or thrice a day. A weak solution of alum or carbolic acid is also a useful application.

Shoulder abscess, to which we have referred above, is usually deeply seated among the muscles of the part, and requires a considerable time to come to the surface. It is usual with some practitioners to apply a repetition of blisters to the part at suitable intervals, with the object of exciting inflammation in the tissues, to hasten its formation, and those who are not skilled in surgical practice might safely adopt this course and wait results. Others cut down upon the abscess, evacuate the pus, and lay the cavity open; or, should no pus be found to exist, the growth is removed wholly or in part, according to circumstances, and the wound treated in the ordinary way. (See Special Treatment of Wounds, p. 410.)

22. FIRST AID TO THE SICK AND INJURED

It is important that horse owners and those in charge of animals should be able to render temporary assistance in the case of accident or sudden illness, as by timely aid valuable lives are saved, while, for want of some elementary knowledge such as the St. John's ambulance classes provide, animals as well as men lose their lives or suffer permanent disablement unnecessarily.

The good Samaritan who would render assistance to an animal by the way, or the other on his own premises, is met with an initial difficulty almost unknown to those whose help is offered only to fellow-men. Horses, even the smallest of them, are not easily controlled when suffering acute pain added to fright; they cannot be reasoned with, or lifted when they fall, by the power of any one person, and furthermore, active as well as passive opposition is too frequently offered to those who would give succour to a wounded animal.

Whether on the road, in the field, or in the stable, occasions arise when horses need prompt and energetic assistance from their attendants while professional aid is being summoned.

On the road, broken knees, collisions, &c., may divide the flesh and set up profuse bleeding from an artery or vein of large calibre, and unless hæmorrhage is promptly arrested death may be the result.

In the hunting field one looks for a certain number of accidents and injuries, but how few owners and attendants are in any way prepared to deal with them!

In the stables, horses get loose and injure one another, or, getting "cast" as it is called, spend their strength in useless efforts to regain their feet, and in the absence of assistance frequently suffer irreparable injury. In many ways, then, both in the stable and the field, "first aid" may be wanted.

The bewilderment of sudden and novel circumstances, and the natural revulsion that is felt to blood by all who have received no training in surgery, put the horseman to a disadvantage when called upon to render help for which he is quite unprepared. In the chapter on wounds it has been pointed out that bringing the edges together is of the first importance, and here again the reader may be reminded that the first and most likely step towards arresting hæmorrhage is to be gained in that way. Often a number of small vessels pouring out their contents at the same time alarm the amateur in surgery, but are of no serious consequence, and it is found that when brought together by the closing of the wound with

some mechanical contrivance, these vessels are closed or a clot is formed, and further bleeding prevented.

How is a gaping wound to be closed by a man without appliances? *Non possumus*, is the answer that rises speedily to the lips of him who has never tried. Besides, so many accidents occur within call of professional aid that the habit of dependence becomes established, so that we regard a serious piece of surgery as only possible with a powerful armamentarium of modern appliances. These are useful, nay, admirable, but nearly every civilized man carries with him some sort of means of stopping bleeding: a piece of string, a scarf-pin, or common pin on his waistcoat corner, a pocket-knife, a handkerchief, the lining of his hat and coat. With some of these, and the hair in his horse's tail or mane, he can secure the edges of a gaping wound or plug a deep one. If he has pins they can be pushed through the skin, and with hair from the animal's mane a figure-of-eight suture may be made, to confine and compress the parts. The handkerchief may serve either as plug or bandage, or, failing sufficient length, material can be obtained from the coat-lining or some other garment less valuable than the life of the patient. Without pins, the happy possessor of a pocket-knife can make skewers from the nearest hedgerow, and if not pointed enough to go through the always tough skin of a horse, the small blade will make the hole and the extemporized wooden pins be made to follow, when the figure-of-eight suture before referred to will be the plan to adopt.

In many cases of accident far from home, if actual hæmorrhage does not preclude movement, by which it would of course be excited, it is well to remember that a horse can accomplish a short journey with comparatively little pain or risk which he would be quite unable to perform when allowed to become stiff. It is, therefore, advisable to decide at once whether to wait succour or attempt removal.

Injuries are often in such a position that none of the foregoing suggestions are at all applicable, as, for instance, when a horse falls on his chin and cuts his tongue badly. First aid in such a case is best rendered by compelling the patient to keep his mouth shut, tying him round the muzzle with the neck-scarf or pocket-handkerchief. The saliva and heat of the mouth will do all that is needed to keep the wound from injury.

Horses that have received injuries to the face, when in collision with others or the vehicles they draw, may have divided vessels inside the cheeks or the nostrils. The arteries are seen spurting with blood, but the horseman has no forceps to pick them up with prior to being tied with the piece of string with which we have supposed him to be provided; but his own fingers may be used to produce the necessary compression to arrest bleeding until assistance comes to hand.

Injuries, again, may be under the flank, or in other situations where it may be possible to stuff the handkerchief into the wound or employ cold in the form of water from the nearest stream, pump, or other source.

If he can gain attention from a passer-by and communicate with a dwelling-house, it is most likely that vinegar or alum or spirit can be obtained, any one of which, diluted with water, is an approved styptic.

First aid may be, and indeed often is, too impetuous and ill-considered, as in the case of staked wounds, the horseman rashly attempting to remove a foreign body which a veterinarian would first very cautiously examine as to direction, &c. (see Punctured Wounds). The sufferer from a staked wound should not be walked home without a plug of some kind in the orifice, as without it air is drawn into the loose tissues under the skin, causing much after-trouble. Some portion of the rider's apparel can be spared for this purpose, or suitable material such as tow or cotton-wool may be obtained at the nearest house.

Joints injured by sprain or collision should be supported by whatever in the way of a bandage the horseman can contrive. A stocking is the most serviceable garment, which with the aid of a penknife may be made double the length. First aid in joint injuries often consists in the patience requisite to wait for an ambulance. An injury capable of being cured may be, and often is, rendered hopeless by making the patient walk a long distance, when the nearest stable should in any case be the longest journey the animal should be induced to take.

Where, after a fall or collision, blood is found to be flowing from the nostrils, the mouth, or other orifices, the patient should not be moved until it is ascertained if the fluid is from a large artery or vein, superficial and unimportant, or deeply seated and serious. By its colour and volume the horseman may be able to decide, and, while waiting for skilled assistance, render first aid by the application of cold water to the head, loins, or other parts.

In every kind of injury in which dirt or other foreign matter is present, as in the eye, an effort should be made to remove it without waiting for the surgeon. If antiseptics (such as are now to be found in every household) are not at hand, then clean water may be used.

Of the many accidents which horses are liable to meet with in the field and upon the road, it is impossible to treat fully in this chapter, and the more important injuries and diseases are elsewhere treated at length. We cannot, however, leave this branch of the subject of first aid, without reference to the comparatively frequent accident in low-lying districts of horses getting into ditches or drains and failing to extricate themselves. The usual bump of locality, which is a horse's strongest

point, often fails him here, for though he may not fall, but deliberately walk into a ditch, he forgets how to return, and, wandering hopelessly up and down in the deep mud, becomes exhausted and chilled, so that he soon succumbs if not released from his unfortunate predicament.

If he is discovered while able to make an effort, the first thing to do is to administer a stimulant while sending for ropes and another horse. He may be in mid-stream, but can be reached by placing a ladder or gate across or into it. A halter should be put on, and if there is room to turn him, and the shelving portion of the bank not so far off but that the almost exhausted animal could walk to it, he should be carefully led, with words of encouragement, to the spot. He may, taking hope again, have sufficient strength to get out when the opportunity is presented to him, and especially if assisted by a rope passed under the buttocks. Rare, indeed, is it to meet with any bad result from the apparently barbarous plan of roping the neck and pulling on it with great force. The ligaments of this part are very powerful, as will be remembered, and the animal no doubt adds resistance to the strain by rendering the muscles rigid and so bracing up the bones. We know that when suddenly applied while the animal is unprepared, less force has caused a broken neck; for instance, when frightened in a forge, a horse has been known to break his neck by throwing himself back in the halter. In urgent cases, roping the neck should be resorted to without hesitation, even though the power of a horse be required to extricate the unfortunate animal from his awkward position.

Collapse is a condition calling for first aid. It is usually the result of some serious injury, and may be recognized by pallor of the membranes, coldness of the skin, sighing, trembling, reeling, and anxiety of countenance. When the result of previous illness, loss of blood, or serious injury, any alcoholic stimulant will prove serviceable, but whisky is to be preferred if at hand. The reader may be reminded that water is a restorative too often forgotten in cases of collapse. It quickly fills up the vessels, and if the patient will not drink it it should in that case be administered by the drenching-bottle—not, however, if the animal is unconscious. In that state any attempt to administer fluids by the mouth involves danger of suffocating the patient, and must be abandoned.

Cold affusions to the head are also restoratives, and, as we have pointed out elsewhere, are commonly employed to re-establish consciousness after chloroform has been given to the extent of producing total anæsthesia.

Much of the first aid required by horses belongs neither to the department of medicine nor that of surgery, but to practical horse management and the tact of experience.

Much of the damage done to or by a runaway occurs after the animal

has come to the ground, and the horseman should learn to control an animal in this position, and know the quickest way in which to release a fallen horse, whether in single or double harness. It should be borne in mind that, in any kind of trace-harness, both traces are set at liberty by undoing the hame-strap. A horse fallen in ordinary single harness should have first the breeching-strap undone and passed through the back-band (he will most likely be lying on the buckle of the other side). It is not essential that the belly-band should be released, though better to do so if time permits, but with the hames and breeching undone he can get up readily.

First aid to the sick among horses generally consists in obtaining for them a suitable environment, removal from the field, or from the companionship of others, the provision of an airy loose-box, the preparation of an abundant supply of hot water, bandages, gruel, poultices, &c., which will be found fully dealt with in the chapter on nursing.

Sick or injured horses incapable of travelling on their own feet are usually conveyed in "floats" or bullock carts, the floors being near the ground, and thus facilitating ingress and egress.

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23. MEDICINES

INTRODUCTORY

The medical treatment of man and beast has for so many centuries been associated in the mind of the public with the administration of drugs, that any attempt to combat disorders without them is regarded with suspicion by the less-educated portion, and of the majority it may be said there is a sense of dissatisfaction where the human or animal physician neither writes a prescription nor supplies a bottle of medicine. The advice to the average horse owner to apply cold water or change the diet is received in the spirit of Naaman when told to dip seven times in the river Jordan for the cure of his leprosy. Nor is this all the fault of the public; the medical art when no longer confined to the priests, who doctored souls and bodies indiscriminately, soon drifted into the hands of persons who sold mysterious medicaments for the cure of various diseases, their remuneration consisting in the profits on such sales, just as the prescribing chemist continues to do to this day despite all medical laws forbidding him to "act as an apothecary".

If we read the advertisement pages of any agricultural or sporting journal we shall find ample reason to doubt if the technical instruction afforded by university extension schemes does not fall far short of the requirements of the time, since greater fortunes are now amassed by advertisers of quack medicines than was ever the case before in the history of the world. There is a very general popular belief that some herb or herbs exist which will effectually cure any and every disease, if we can but succeed in their discovery and proper application.

These bad old traditions will take long to break down, and in self-defence, in order to obtain a just fee for his professional skill, the country veterinary surgeon is sometimes compelled to prescribe some harmless stuff for a client who sees value for money only in some tangible form like a big bottle. The owner of a horse with a cough is apt to suppose that its cure can and ought to be effected by a bottle of medicine or some balls if they are "good" for such a purpose; nay, he has been taught to believe it by the cure-alls advertised and the early works on farriery, whose authors speak of "a certain cure" for this or that disease which they did not themselves understand, but merely "poured drugs of which they knew little into bodies of which they knew less".

It is not generally understood that the same disease may result from a variety of causes, and no panacea can therefore be expected. The conditions under which the patient has been living must be enquired into, the nature of his work, food, water supply, clothing; and a broad view must be taken of the circumstances of the case, and the line of treatment to be pursued will depend on the nature, origin, and stage of the disease.

The importance of hygienic conditions and good nursing are becoming better understood both by the professional and amateur horse doctor, but the latter, with less knowledge of drugs, has the greater faith in their efficacy. Let it not be supposed that we underestimate the value of drugs when judiciously employed, but that we desire to impress our readers with the fact that drugging is no effectual substitute for rational treatment.

The cause of a disorder should be sought and removed, and drugs may assist the process in many instances. Time may be gained in facilitating a natural process, pain saved, and even life preserved, which without their aid would have been lost; but the list of *specifics* can be counted on the fingers of one hand.

Perhaps no class of medicines are more abused than aperients, the habitual use of which do not cure constipation but induce an artificial need of their repetition, where judicious dieting without drugs would help the body to return to that healthful condition for which it is always striving in spite of improper diet and exposure to unfavourable conditions. The

tendency to recover from, as well as to resist, disease is commonly spoken of as the *vis medicatrix naturæ*, and should be the prescriber's chief reliance. Expectant treatment, or waiting for nature to assert its preservative influence on the life and well-being of each living creature, is more adopted by the experienced physician than the amateur, who desires some heroic remedy that shall cut short diseases, many of which pass through successive well-known stages, and anything that would hinder the process might prove fatal to the patients. The variolous diseases, for instance, must pass through their various phases of incubation and eruption, papulation, vesication, or pustulation, desquamation, and final recovery, which latter cannot take place if the course of the disease be interrupted by improper treatment. There are no remedies known even to the best informed which will cure such diseases as variola, whether in man or horses, and any treatment adopted should be of the expectant order. Excessively high temperatures may be reduced by judicious administration of drugs; constipation may be relieved or other special symptoms alleviated; but the disease having a certain course to run, the patient must be kept under the most favourable conditions as to food, clothing, diet, and atmosphere.

To prescribe for horses, a knowledge of their organs, the functions they perform in health, and the nature of those departures from health which we call disease, is absolutely indispensable. In addition to this we require a knowledge of therapeutics, or the action of medicines, in order to employ them successfully.

This department of veterinary science has not made progress in proportion to surgery, hygiene, and other branches of medicine. No sufficiently accurate observations are recorded over a long period of the action of drugs upon animals in health, but out of the collective experience of our best veterinary surgeons a workable amount of knowledge has been evolved. The horse owner who reads this remark will naturally wonder that the schools have not taken the matter to heart, and devoted much more labour to that side of the practice of medicine which always appeals most to the layman.

One of the obstacles to progress in our knowledge of the action of drugs upon the horse in health is the Anti-vivisection Act, which makes penal the administration of the simplest drugs by way of experiment, while permitting many barbarous practices if done with the object of curing disease or rendering animals more useful or profitable.

Our knowledge of the action of drugs, we have said, is unsatisfactory, and although we have borrowed largely from the older profession of human medicine, we have an accumulated knowledge of an empirical kind which is

valuable, although we cannot give a reason in all that pertains to it "for the faith that is in us". With all the advantages enjoyed by our medical friends, their practice is still largely empirical, and the scientific reason is often not forthcoming until a century or two has proved the utility even of such medicines as quinine and sulphur.

MEDICINES AND THEIR PREPARATIONS

The following useful formulæ may be taken to represent those "stock" medicines which are kept in readiness in large studs for ordinary and uncomplicated cases which may be anticipated where any considerable number of horses are employed.

The purgative or aloetic ball is, in the language of the horseman, called "physic" or a "physic ball", to the exclusion of all other medicines with equal rights. While unwilling to perpetuate a wrong impression, it is absolutely necessary that our readers should be quite clear as to the meaning of the term. They are spoken of as so many "dram" physic-balls, and this always relates to the number of drams of aloes contained in the bolus, and not to its gross weight, which will be about one-third more. A dram or so of ginger in powder is usually found in each dose, and is given with a view to preventing any griping effects from the aloes.

The cheap, ready-made balls obtained at drug-stores are too often made from Cape and Socotrine aloes, which long experience has proved to be less suitable for horses than the variety known as, and chiefly obtained from, Barbados.

The materials used to give a proper consistence to a mass are various; the common object desired is a substance that can be cut and manipulated into a shape that it will retain when wrapped in paper. Soft soap is a convenient material if the ball is to be used immediately, but hardens too much if kept as a mass. Glycerine, castor-oil, linseed- and rape-oil are also used, the first-named retaining the moisture and consistence desired, and not having the objection of greasing and staining the wrapper, which is the invariable consequence of employing oils, unless a gelatine capsule is substituted for paper; but these again offer a disadvantage in being slippery when wet, and therefore more likely to escape from the hand in the act of being administered. (See Administration of Balls.)

The formula recommended by Professor Tuson of the Royal Veterinary College has been largely adopted. It is as follows:—

Barbados Aloes	8 ounces.
Powdered Ginger	2 ounces.
Rape-Oil	1 ounce.

These ingredients are melted together in a "water bath" (fig. 426) and incorporated by constant stirring.

Another formula, which was published by Messrs. Elliman, and claims to be plastic, ductile, and soluble, is given below:—

Best Barbados Aloes	10 parts.
Glycerine	1 part.
Castor-Oil	1 part.
Powdered Unbleached Ginger	½ part.

The aloes are directed to be dissolved in glycerine with the aid of the water bath, the castor-oil added, and the ginger stirred in lastly.

The dose of aloes, when intended as a purgative, varies considerably according to age, size, and breed, besides which it is found that in some districts a larger quantity is required to take an equal effect.

In the southern part of England four drams may be considered a fair dose for a carriage horse or hackney, and five or six, or even seven, for a draught-horse; but these doses are considerably exceeded in Scotland and some of the western counties of England with apparent safety. Much larger doses were formerly given, but without proper preparation.

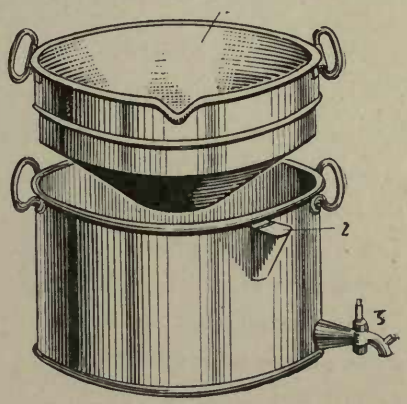


Fig. 426.—Water Bath

1, Earthenware lining. 2, Inlet for water. 3, Tap for drawing off water.

Preparing for Physic.—Bran mashes only should be allowed for twelve to twenty hours before giving the ball; all dry food removed, and abundance of drinking water, not quite cold, should be administered. Thus prepared for, a five-dram dose will probably prove more active than a larger quantity given on the top of dry hay or hard corn.

The full effect of an aloetic purge is not realized for about eighteen hours, and to facilitate its action exercise is prescribed, but it should be discontinued as soon as purging commences. The animal should not be called upon for active exertion until the physic has "set" or the fæces resumed their ordinary consistence, and the appetite for hard food has returned and been appeased.

Condition Balls.—The term "condition" as applied to horses may imply two quite different states. As used by the hunting man or the owner of race-horses it means hard condition—firmness of muscle and the fullest development of the powers of heart and lungs, to sustain the animal

during long-continued exertion—and it is brought about by a system of training which has become a fine art. A physic-ball is often the first act in the preparation, and other balls or powders for conditioning follow. They appear to have the effect of getting rid of effete material, and enabling the subject to derive the utmost benefit from the food consumed and the carefully-apportioned exercise enforced. Appended is a recipe for a famous proprietary ball which has been largely used in racing- and hunting-stables throughout the kingdom:—

Calomel	15 grains.
Socotrine Aloes	25 grains.
Powdered Ipecacuanha	50 grains.
Nitrate of Potash	2½ drams.
Hard Soap	1 dram.

The above dose is given twice a week for about three weeks, and then an interval allowed, as there is danger of over-stimulating the liver.

Show or dealer's "condition" is as opposite from the fine-drawn racer or "fit" hunter as possible in a horse in good health. Even the best judges of horses are favourably impressed by the round and sleek appearance of the dealer's horse that has been fed upon boiled foods and "stodges". The purchaser sees in such a horse a good "doer", and the seller is able to conceal some defects by loading on fat. To enable the horse to digest and accumulate a large amount of fattening food while taking but little exercise, recourse is had to such drugs as assist to prevent fermentation in the digestive tract and further act upon the kidneys and skin, giving a soft and glossy appearance to the latter.

The spices and so-called "foods" sold for this purpose are chiefly composed of salt, fenugreec, and lentil flour. A favourite ball for this kind of conditioning is composed of equal parts of ginger, aniseed, gentian, grains of paradise, and liquorice made up with treacle or glycerine.

MEDICINES WHICH ACT UPON THE BLOOD, AFFECTING THE NUTRITION OF THE ENTIRE BODY

The character and composition of the blood, and the part it plays in the animal economy, has been dealt with in that part of this work devoted to physiology. It has been shown that every part of the body depends upon the blood for the supply of those materials which maintain it in health and repair the waste that is always going on.

Every tissue, nerve, muscle, bone, skin-cell, and hair-follicle depends upon the blood-stream for its maintenance, every gland for its functional activity.

The nutritive material so constantly being given up by the blood for the sustenance of the body is renewed by the food in its passage along the digestive canal. The blood also serves as a vehicle to remove waste products from the body, chiefly by the lungs, kidneys, and skin, and through its medium the body is affected in various ways for good or ill. If from any cause it is deficient in the materials needed for repair or secretion, the body as a whole or some part thereof will suffer, as will also be the case if some deleterious matter be allowed to remain in the blood-stream in excessive quantity, or beyond the time when it should be separated and passed out.

It is intended by the foregoing remarks to show how the nutrition of the body may be affected by introducing into the blood agents which, being carried to all parts of the system, exercise some influence upon its tissues.

The preparations of iron in forms not detrimental to digestion, together with suitable diet, appear to increase the production of red corpuscles and improve the general health.

It is sometimes desirable to employ substances which, instead of inducing the red blood corpuscles to give up oxygen freely, will arrest combustion. Where the body-heat has risen above the normal standard, and a condition of fever prevails, we employ for this purpose quinine, alcohol, salicine, and some other agents, the effect of which is to reduce temperature.

Medicines also act upon the blood by increasing the amount of albumen, salts, fat, phosphorus, &c.

BLOOD TONICS

These are remedies which supply materials in which the blood is deficient, and thereby improve its quality; as the greater number of them also increase the red colouring matter of the corpuscles, they are called hæmatinics.

Iron.—At the head of the list stands iron. The preparations most in use for horses are the sulphate in crystal or exsiccated, then come reduced iron, saccharated carbonate and phosphate, tincture (steel drops), iodide of iron, and arseniate of iron. The citrate and tartrate might sometimes be used for horses with advantage, although much more costly than the first-named preparations, which are most largely employed.

Action and Use of Iron.—Iron in its various forms, but more particularly in certain solutions, has a direct effect upon the tissues with which it comes in contact and before it enters the circulation.

It is more or less strongly astringent in proportion to the strength of the solution, and may be made to exert its influence on various external and internal parts, as the mouth, throat, gullet, stomach, and bowels. Blood and other albuminous fluids are coagulated by the salts of iron, and this property is made use of in medicine to arrest hæmorrhage or bleeding both from internal organs and external parts. Its constringing effect leads to its employment in obstinate cases of diarrhœa and catarrhal conditions of mucous membranes generally.

By the administration of iron the fæces are blackened as a result of the formation of sulphide of iron in the intestinal canal. With the horse we have seldom those irritable conditions of the stomach which in the human subject preclude the use of iron. Any existing difficulty in this direction may be overcome by selecting the least irritating preparations, as the saccharated carbonate and reduced iron.

The chief value of iron is due to its action upon the red corpuscles, and through them upon the organs and tissues of the body. It is therefore prescribed in cases of wasting and mal-nutrition, and in hæmorrhage to arrest the flow of blood, as well as in the case of chronic discharges from mucous membranes. It is also given in purpura and similar blood disorders.

In combination with other agents, as strychnine and arsenic, quinine and vegetable bitters, iron is given as a nerve-tonic and muscle-builder. With iodine it is prescribed for the removal of effusions, as those in the chest cavity resulting from pleurisy, and for the reduction of glandular swellings and bony deposits on the limbs and other parts of the body. As an astringent application it is sometimes used for grease and applied to indolent sores and ulcers.

As an antidote in cases of arsenical poisoning, iron is used in the form of hydrated oxide.

DRUGS FOR REDUCING THE ALKALINITY OF THE BLOOD

The chief of these are the salts of soda, potash, lime, and magnesia. The potash salts in veterinary use are the carbonate, bicarbonate, nitrate, acetate, chlorate, tartrate, iodide, and bromide.

The potash salts have varied uses, and produce different effects according to the preparations used and the dose prescribed. Thus the bicarbonate is very largely used in some forms of dyspepsia, especially in those cases where the acid secretion of the stomach is in excess and requires to be neutralized; it is also employed as a febrifuge. The tartrate and acid tartrate are slightly aperient in large doses. The nitrate is perhaps more used in veterinary practice than any other drug in the pharmacopœia, and

probably, it may be added, more abused than any other by grooms and carters. Its action is febrifuge, and it is referred to here on that account; but its chief action being in connection with the kidneys, it will be more fully considered in dealing with drugs acting upon those organs. Potash salts, more particularly the carbonate and bicarbonate, enter the blood rapidly and increase its alkalinity. The red corpuscles already contain potash, and appear to possess a great affinity for it, the number of red blood corpuscles being increased rapidly when potash and iron are given together. By increasing the amount of water passed by way of the kidneys, they tend to promote absorption of fluids effused into the tissues and cavities of the body. The action of a combination of potash and iron in this respect is well known to stablemen and others, who use it to disperse those temporary swellings of the legs so commonly resulting from rest or overwork.

Chlorate of potash is a valuable drug in some cases on account of its antiseptic properties. In soreness of the throat and the mouth it is prescribed as a gargle or mouth-wash, or it may be applied as a powder to abraded surfaces.

Potassium chloride is a powerful caustic employed for the destruction of living tissues in the form of morbid growths such as warts, proud flesh, and other abnormal excrescences, callous sinuses, and fistulous surfaces. By it "proud flesh" is removed, as well as the callous sinuses of fistulous wounds, such as occur in poll evil, quittor, &c. Diluted freely with water, it has powerful antiseptic and disinfectant properties, being largely used under the name of Burnett's fluid.

Permanganate of potash is a valuable salt, and largely used as an antiseptic, deodorizer, and disinfectant; and being a perfectly harmless substance, is employed for injections into the mucous cavities of the body, as well as for mouth-washes and gargles.

It is considered valuable in cases after difficult parturition, for which it is used in the proportion of about ten grains to each pint of warm water injected into the uterus.

Soda.—The preparations used in veterinary treatment are the carbonate and bicarbonate, sulphate, hyposulphite, biborate (borax), and chloride (common salt). In the last form it is a constant constituent of the blood and of all the tissues of the body; horses, like man, appear to be benefited by the introduction of this salt of soda into their food. Most horses like it, and readily lick it from salt rolls or salt rock. Soda salts do not enter the blood so readily as those of potash, and they are most frequently prescribed for neutralizing acidity in cases of acute indigestion and gastric disturbances, and as a saline aperient. Sulphate of soda is an excellent aperient, and has been in use for many years under the name of

Glauber's salt. Hypophosphites are thought to be beneficial in restoring nutritive function in some febrile diseases.

The general uses of soda are the same as those of potash and magnesia. Except in the form of sulphate of soda, the drug is not much employed by veterinry surgeons.

The sulphate is one of the most valuable drugs we have, and in small doses is alterative and diuretic, and in large ones aperient. (See Aperients.)

The solution of bicarbonate of soda is a valuable antacid, which may be used in such cases as those for which bicarbonate of potash is prescribed. Being tasteless, horses may be induced to take it in the drinking water when refusing other saline medicines.

Lime.—Preparations of lime are seldom used in the treatment of horses, but the carbonate, in the form of chalk, is sometimes employed as an antidote to poisoning by corrosive acids, and as an astringent in diarrhœa.

COOLING MEDICINES, ANTIPYRETICS

The class of medicines known as "cooling" are those which, like quinine, retard the discharge of oxygen from the red corpuscles of the blood instead of facilitating the process, as do iron and potash in combination.

Antipyretics (Greek *anti*, against, and *puretos*, fever).—Besides quinine, which stands at the head of the list, and the action of which has been already explained, there is salicine, whose action in reducing temperature is very marked, though the *modus operandi* is not yet clearly defined.

A number of synthetical compounds of German origin much in vogue in human practice are employed by some veterinarians, but their utility in equine practice cannot be said to have been established. The large doses required, and the considerable cost, preclude their use on a large scale in establishments where their therapeutical value could be best tested. Among them may be named antipyrin, antifebrin, kairin, phenacetin, &c.

The veterinarian is accustomed to regard saline aperients as "cooling" medicines, and they undoubtedly do reduce temperature in an indirect manner (see Aperients). Remedies which act upon the skin and kidneys also lower the animal heat, and the application of cold water does so by evaporation and the subsequent determination of blood to the surface. Clothing, by inducing perspiration and increased activity of the skin, also tends to lower the general temperature.

There are other drugs which depress the activity of tissues, and provided the loss by waste remains the same, a lowering of temperature

follows. To this class belong alcohol and digitalis, strophanthus, aconite, and belladonna.

These drugs in proper doses do not reduce the normal temperature of the healthy animal, but there is general agreement among practitioners as to their effect in cases of pyrexia.

Quinine, as most of our readers are aware, is obtained from the bark of the cinchona tree (fig. 427). There are several varieties, some of which are richer in the alkaloids than others. The virtues of the bark were more or less known to the South American Indians before the Jesuits introduced it to Europe.

QUININE AND SALICINE

Uses of Quinine.—As a stomachic or bitter tonic quinine is one of the most valuable remedies known to medicine, promoting appetite, digestion, and assimilation, and raising the general tone of the system after attacks of fever and other diseases, which leave the animal in a state of weakness. In doses of one or two drams no bad consequences are to be feared, but, judging by its indiscreet use in man, it may be supposed that excessive quantities would have a like effect in inducing giddiness, impaired vision, &c. So far as we are aware, no one has entered upon the costly experiment of over-dosing horses with quinine, but its value in quantities not exceeding half an ounce at a time is now very generally recognized among veterinary surgeons.

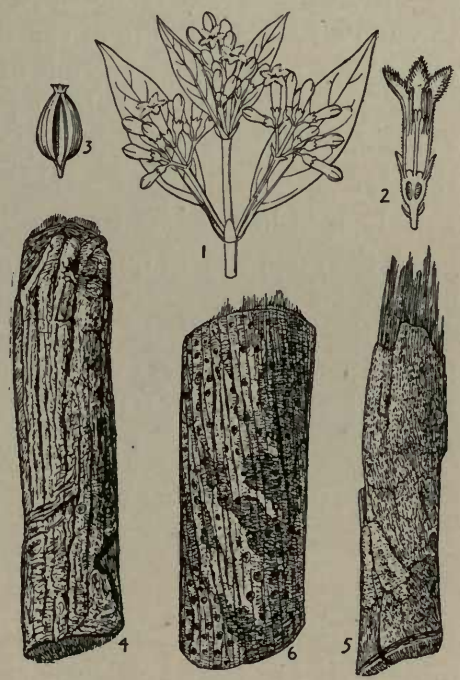


Fig. 427.—Cinchona lancifolia

1, Flowering branch. 2, Section of flower. 3, Fruit. 4, Older quill of bark (Columbian), soft. 5, Younger, showing patches of cork. 6, Hard bark (Carthagena).

Combined with alcohol, it has been found one of the most useful agents in the treatment of that prostrating fever generally termed influenza.

By its action on the blood it arrests fermentation and destroys or inhibits the action of blood-poisons. This is seen after difficult parturition, with rising temperature and threatening dissolution. In purpura hæmorrhagica it is used with good results in alternation with turpentine and alcoholic stimulants. Its germicidal properties render it useful for

certain forms of sore throat due to septic matter. The growth of deleterious organisms is checked by its presence outside the body, and in this connection it may be reasonably assumed that its activity is still continued when introduced into the living organism.

Quinidine, cinchonine, and the other alkaloids of cinchona bark are credited with the same medicinal powers, but not in the same degree. It is possible that the combination of them with quinine in some way exerts a better influence than quinine alone, as there are many good observers who claim to get better therapeutical results from a tincture of the bark, than from the latter given as a powder.

Salicine, when obtained from willow bark, is an expensive agent in the large doses required for horses. The bark of the poplar-tree and the flower-buds of the meadow-sweet also contain it, but not in sufficient proportion to be of any practical value as a source of supply.

Salicylic Acid is obtained by passing a stream of carbonic acid through a heated mixture of caustic soda and carbolic acid, but its natural source of supply is from the oils of winter-green or sweet birch.

Actions and Uses.—In the reduction of high temperatures and the treatment of rheumatism it is the most active remedy known. Some of the obscure lamenesses of a shifting and intermittent character have been quickly banished by its use. Salicine and salicylic acid appear to act in much the same way as quinine, and excessive doses produce the same train of symptoms.

Salicylate of Soda is very much employed in reducing temperatures, but its liability to excite abnormal action of the heart requires special care and observation where its use is to be continued.

MEDICINES WHICH ACT ON TISSUE CHANGE

ALTERATIVES

Alteratives comprise a number of drugs of importance to the horse owner. It has been previously stated that they alter the nutrition of the body and bring about certain desired results, not only in relation to disease, but also in the process of training the horse in health for particular purposes. These results are obtained without any marked action upon any particular organ. It is supposed that alteratives act by inducing minute chemical changes in the economy which are quite inappreciable by ordinary methods of observation, but yet of a more or less lasting character. If given medicinally, their action may remain permanent, but an animal artificially "prepared" or got up for show purposes, and maintained in

show condition by their aid, will often fade or lose his bloom when after long use they are discontinued.

The glossy skin beloved of horse dealers and exhibitors is often the result of a course of arsenic, antimony, sulphur, and nitre, which are chiefly employed on account of their action upon the skin. Sulphuric acid (oil of vitriol) is the chief agent of the teamster, who too often relies on such mixtures to impart sleekness to the coat, which can only be otherwise obtained at considerable expenditure of manual labour.

Arsenic.—The preparations used in veterinary medicine are white arsenic (arsenious acid), solution of arsenic, and the arseniates of iron and copper. This drug is a deadly poison, and should not be administered for any purpose save by the advice of a qualified veterinary surgeon, and in no case upon an empty stomach, as it is irritating to the mucous membrane of the alimentary canal. Notwithstanding this, carters and others are in the habit of giving large doses after fasting, for the expulsion of worms, and sometimes this has fatal consequences.

As an alterative, arsenic is given in small doses gradually increased. If given in a ball, the dose can be accurately apportioned and controlled, and combined with an alkaline solvent; but the practice of giving it as a powder is dangerous and objectionable, inasmuch as it is liable to fall to the bottom of the manger and to accumulate there, later to be taken as a fatal dose when that receptacle is licked clean after a bran mash or other moist food. The solution *Liquor arsenicalis*, or Fowler's solution, is the most satisfactory preparation, as it may be given in the food without incurring the risk referred to above. When arsenic has been administered for some considerable time, and it is desirable to discontinue its use, the dose should be gradually reduced and not suddenly discontinued, a remark that applies more or less to all alteratives.

Action and Uses of Arsenic.—Externally it is employed as a caustic in the form of a paste to destroy warts and other growths, and in weak solution as a parasiticide. Besides its alterative action when given internally, it is sometimes employed as a stomachic or stimulant to the stomach to aid digestion. It combines with the blood corpuscles, and the more readily when in combination with iron. All the organs and tissues of the body receive it from the blood, and for a time it remains incorporated with them; but it is eventually eliminated by the liver, the kidneys, and the skin, through the medium of their respective secretions, the bile, the urine, and the sweat.

Intractable skin diseases, especially those of a constitutional character, may often be treated successfully with arsenic given in the food. Where animals are known to suffer from periodical outbreaks of skin disease, a

course of arsenic, especially if given during the moulting period, may have the effect of checking its eruption.

In the chronic cough of broken wind, arsenic has been found a valuable remedy.

ASTRINGENTS

Astringents are agents which cause constriction or contraction of the tissues to which they are applied, and diminish the amount of secretion from mucous membranes.

The action of astringents may be local or remote. In the former case they are brought directly into contact with the part, as in the case of gargles, injections, eye-washes, &c. In the latter it is necessary that they be first absorbed into the blood, and by it be conveyed to the part to be acted upon. Cold, in the form of ice, evaporating lotions, or freezing-mixtures, is spoken of as an astringent. The mineral acids, and their salts also, if soluble, have a similar effect, particularly the salts of lead, zinc, iron, copper, aluminium, silver, and mercury. Among the chief vegetable astringents used in veterinary medicines may be mentioned gallic and tannic acids, and the barks of trees which have astringing or binding properties due to these or similar constituents. Oak bark and oak-galls are among the most powerful; white elm bark, catechu, witch-hazel, and others are more or less employed on account of their astringent properties.

The immediate effect of such agents upon mucous surfaces, and soft parts generally, is to contract them, whilst some also coagulate the albumen with which they are brought into contact.

The action upon living tissues is somewhat similar to that of tanning skins, by the formation of a tanno-gelatin.

Some astringents administered as internal medicines counteract the relaxed condition of mucous surfaces, and some possess the property of arresting hæmorrhage.

Externally applied, remedies of this class arrest excessive secretions and discharges of pus, serum, and mucous or muco-purulent discharges, as, for example, in abscesses, ulcers, and catarrhal diseases of a more or less chronic character.

Astringents in the more popular acceptation of the term are those remedies usually employed to arrest diarrhœa only, but it will be seen from the foregoing remarks that their uses are very diversified.

Certain astringents have the property of causing contraction of the blood-vessels, decreasing the amount of blood circulating in the parts, and so lessening the quantity of secretion given off by it. The mineral acids, sulphuric especially, have this astringent effect.

Nut-Galls.—Although tannic acid is extracted from nut-galls (fig. 428), yet in practice we find powdered galls have certain advantages over the active principle for some purposes, while tannic acid is best suited to others. Powdered galls are less astringent than tannic acid, and rather more so than oak bark, elm bark, or catechu. They are not absorbed with the facility of alum, or iron, but have the effect of coagulating albumen. In horse practice they are used in electuaries for relaxed and sore throat, and abrasions of the mouth and fauces generally, where a somewhat constringing effect is desired from an agent that is not likely to be taken up into the circulation. The powder is also prescribed with success, as a ball, in cases of polyuria or profuse staling.

Fig. 428.—Nut-Galls

1, 2, Nut-Galls (Aleppo) from Quercus infectoria. 3, Transverse section.

Tannic Acid.—The action and uses of tannic acid, or tannin as it is sometimes called, are similar to those of nut-galls above described, but it has the additional advantage of solubility.

Where the bowel discharges are of such a character as to suggest abraded surfaces, tannin is administered with great advantage not only on account of its power to check secretion, but also because of its action on the bleeding vessels. It is soluble in water and spirit, and has a special affinity for glycerine.

Gallic Acid.—This astringent is nearly allied to tannic acid, both in chemical composition and therapeutic value and uses.

Oak Bark.—The bark from young trees and the smaller branches is preferred for medicinal purposes, as containing a relatively larger amount of the astringent principle than is to be found in other portions. It has a special value in the treatment of chronic diarrhœa and bowel discharges of a dysenteric type. It is usually prescribed in the form of decoction, both as an internal remedy and as an application to languid sores and indolent ulcers.

Catechu is a vegetable extract of special value as a bowel astringent, and is frequently combined with opium and chalk. It is prescribed as a powder, tincture, and infusion.

Kino is similar in its action, and chiefly employed as an intestinal astringent or gargle.

Alum.—There are a number of compounds of alumina, but that commonly known as "alum" is a sulphate of ammonia and alumina. Veterinary surgeons value the drug highly, and employ it for a variety of

purposes. It is used in several forms—as a crystal of irregular shape, as a powder, and as burnt, exsiccated, or dried alum, that is after it has been deprived of its water of crystallization.

Externally it is used for all the purposes to which other astringents are applied, except as a styptic, as it has no very marked influence in arresting hæmorrhage of a serious character. In the dried form, alum is very much more active than in the other conditions, and is a valuable dressing for wounds, ulcers, and fœtid discharges of various kinds. In combination with flour and oxide of zinc it is used for cracked and chapped heels, and for grease and skin eruptions upon the legs and belly.

For injuries to the tongue, or any part of the oral cavity, alum is invaluable. It has been found, in cases where the cheeks and gums have been denuded of membrane, or the tongue has suffered serious laceration, that a solution of alum speedily brings about the formation of a protective covering. In some forms of diarrhœa, and in prolapsus of the womb or bowel, it is an excellent astringent. It is also employed as an eye lotion, in powder as an insufflation, and in solution as an injection up the nostrils in cases of ozena. It has long been esteemed for drying up the milk of mares when, through loss of the foal or other causes, it is desirable to arrest the mammary secretion.

Iron.—In addition to its great value as a tonic, iron is one of our most valued astringents. There are a great many preparations of it, of which the following are in most common use in veterinary practice: sulphate, carbonate, and solution of perchloride.

For arresting hæmorrhage outside the body, the solution of perchloride is a most efficient preparation. It enters into the astringent lotions employed in the treatment of thrush, grease, and other diseases attended with foul discharges and fungoid growths.

Copper.—The salts of copper are used in much the same way as those of iron, but the sulphate, which is the preparation most employed, is more astringent than that of iron. In grease, thrush, and canker it is employed as a lotion or in powder, either alone or in combination with other astringents. It has the most drying effect of any of the astringent metallic salts when applied to raw surfaces. In special cases it is prescribed as an intestinal astringent.

Zinc.—The preparations of zinc used in the medical treatment of horses are the sulphate, acetate, chloride, oxide, carbonate, and oleate. The salts vary very much in their astringent and caustic properties.

The oxide and carbonate are but very slightly astringent, and in this connection are used only as cooling and drying agents. The acetate, sulphate, and chloride in weak solutions are astringent.

CHESTNUT HUNTER GELDING, ARTIST

By Highthorn. The Property of John Hadland, Esq., Beverley.
Winner of Numerous Prizes.

Silver.—Only one salt of silver is used in horse practice, and that is the nitrate, or lunar caustic as it is also called. As a weak solution it may be prescribed as a mouth-wash, when a spongy state of the gums indicates the need of a sharp and quickly-acting astringent that will not require frequent repetition, as might be the case if tannin or some of the simpler washes were employed. For the suppression of soft granulations and the formation of a level scab, nitrate of silver is probably the best of all the metallic salts, and is much used in the treatment of broken knees and other skin wounds, when the object in view is to secure the least possible permanent blemish.

As an eye lotion it is and has been long in repute for a variety of affections of the visual organs. By its effects upon the vascular structures of the eye it causes absorption of specks or cloudiness of the cornea if they are not of long standing. In small doses internally administered it is astringent, and occasionally prescribed when ulceration of the stomach or bowels is suspected.

Bismuth.—As a bowel astringent this drug is valuable either in solution or powder. In the latter form and with chalk it appears to act mechanically by forming a smooth coating over the mucous membrane.

Chalk, or carbonate of lime, is a safe and often effective astringent in cases of diarrhœa, particularly in those instances in which a general acidity of the intestines gives rise to it.

DRUGS WHICH ACT ON THE HEART AND BLOOD-VESSELS

Drugs in this section are conveniently divided into four classes, namely: heart stimulants, heart tonics, heart sedatives, and those which act on the blood-vessels (*a*) by contracting them, and (*b*) by relaxing them.

Heart Stimulants—

Ammonia. Ether.
Alcohol. Camphor.

Heart Tonics—

Digitalis. Strophanthus.

Heart Sedatives—

Aconite. Belladonna.

Drugs which contract the Blood-Vessels—

Acetate of Lead.
Gallic Acid.
Ergot.
Witch-Hazel.

Drugs which relax the Blood-Vessels—

Nitrite of Amyl.

Disordered blood-distribution may be due either to the heart or its blood-vessels acting improperly, or to both.

In another section the composition of the blood has been described, and the method of its distribution in health; but an animal may possess good

blood and perfect vessels by which to convey the life-fluid to all parts of the body, and yet perish, if the heart fails in its work as a central pumping station, or if the blood-vessels of one organ are surcharged, while the nutrient supply fails to reach others.

The causes of disordered circulation are irregularities of the heart, whose contractions may be too forcible, too feeble, or irregular; or the heart may be capable of doing its work efficiently, but the vessels may offer undue resistance by reason of their calibre being abnormally contracted; or, on the other hand, they may be so far relaxed as to permit too free a flow of blood to a particular organ, causing congestion.

Remedies which affect the heart and blood-vessels are therefore of great importance, and deserve careful consideration.

HEART STIMULANTS

It has been elsewhere explained that the heart is a muscular organ which, by its contractions, propels the blood over the body. If it contracts with inadequate force the cavities are not properly emptied, nor the blood-vessels filled, and nutrition is impaired. If by shock or hæmorrhage an insufficient blood-supply is sent to the brain, its functions are suspended, and the animal faints and falls. The recumbent position thus assumed is favourable to recovery, and with removal of the cause the heart's action may be restored. When syncope threatens a horse he staggers, and in trying to keep upon his feet gives us some warning of his condition, which it is well to heed for his sake as well as our own safety. Trembling, sighing, and staggering will be noticed, and an examination of the membranes shows them to be blanched, or pallid, like the countenance of a person about to swoon. If a heart stimulant is given, the function of the organ will probably be restored for the time, and the brain again recovering its due supply of blood, consciousness will return.

Any failure of the heart acts upon its own substance, which, like every other part of the body, derives its nourishment from the blood.

The heart receives its stimulus through the nervous system, and it has within it certain minute nervous bodies (ganglia) designed to excite and carry on the rhythmic movements which are commonly called "beats". Remedies which influence the beats of the heart do so through these nerve-centres being acted upon by agents which have entered the blood-stream. They are further controlled by the pneumogastric nerve, which slows the action of the organ, and by the sympathetic nerves, which excite it; and it is through the medium of these that stimulants are able to increase both the frequency and the force of the muscular contractions.

Heat is a rapid stimulant when applied to the walls of the chest, or as a hot fluid passed into the stomach; but in the equine patient we have to rely chiefly upon drugs, and of these alcohol, ammonia, ether, and camphor are the chief.

Ammonia is a gas dissolved in water, but in that condition is not often employed in horse practice.

The chief preparations are:—

Strong Liquid Ammonia.	Carbonate of Ammonium.
Dilute Liquid Ammonia.	Chloride of Ammonium.
Aromatic Spirit of Ammonia.	Acetate of Ammonium.
Liniment of Ammonia.	

Actions and Uses.—Ammonia is a stimulant when applied to the skin, the neutral salts having the least action and the strong liquid the greatest, the latter producing vesicles like an ordinary blister. Weak solutions are used to neutralize the stings of insects, which are usually acid. When inhaled, ammonia rouses the heart and quickens the pulse and respiration. It is employed in this way as a restorative after operations under chloroform when the patient is disposed to remain too long under its influence. The liquid is particularly irritating to the nostrils, and should not be brought into actual contact either with the thin skin covering them or the membrane within.

Ammonia has a stimulating effect also when passed into the stomach, and the preparations to be preferred for internal administration are the aromatic spirit (sal volatile), largely diluted, or a solution of the carbonate. In the latter form it not only increases the heart's action, but stimulates the stomach and bowels before it enters the circulation. For this reason it is a valuable remedy in flatulent colic, and for various forms of indigestion it is prescribed with vegetable tonics.

It is given in respiratory affections because it stimulates the membranes of the bronchial tubes to expel mucous matter from their surface. The acetate is employed as a febrifuge, and promotes the action of the skin.

Chloride of ammonium is given in chronic diseases of the liver, and as an external remedy it is used in combination with other drugs as a cooling or evaporating lotion for inflamed joints and tendons.

Ether.—This drug has long been a constituent of colic draughts, and is one of the most rapidly diffusible stimulants. Its action upon the heart is very marked, and it is employed in a variety of ways, subcutaneous injection being the most rapid. It is also used as an anæsthetic.

Camphor.—Camphor is a concrete volatile oil obtained by sublimation from the twigs of the camphor tree, which grows in the Dutch Indies,

China, and Japan. It is a valuable drug in veterinary practice, and is given internally as well as applied to the skin in various ways. Its chief preparations are spirit of camphor and the compound tincture (better known as paregoric elixir), camphor liniment (camphorated oil), and camphor water.

Action and Uses.—Externally applied, camphor acts as a stimulant to the skin, and is employed as a liniment, in combination with oil, ammonia, soap, and other ingredients, for relieving sprains and stiffness of muscles and joints.

It is a stomach stimulant and anti-spasmodic, controlling those contractions of the intestine which occur in some forms of colic, and is prescribed for persistent diarrhœa.

It is also a heart stimulant, and is given in febrile diseases, more particularly to overcome nervous prostration following upon attacks of delirium. Large doses cause excitement and convulsive movements of the muscles.

Alcohol.—Alcohol in the form of brandy, whisky, or other spirit, if not very much diluted, acts as a stimulant both when externally applied and internally administered. The immediate effect of alcohol on entering the blood is to increase the heart's contractions in both number and force, and subsequently to reduce temperature, as elsewhere explained. In cases of fever and prostration, suitable doses of alcohol, whether as wine, spirit, or beer, are found to steady the pulse and reduce the number of respirations; but there are exceptions to be met with among horses as among men. An idiosyncrasy sometimes exists by which individuals are unable to benefit by alcohol, and other stimulants must take its place. The effect of this agent should be carefully watched, as the dose is often excessive and loss of appetite results in consequence. In approaching convalescence the amount should be gradually diminished and not abruptly discontinued. In pulmonary congestion alcohol is a valuable remedy, and in its popular forms readily obtainable. Considerable doses are given, and often with the greatest benefit in the early stages of the affection.

In the form of malt liquors, with gruel, it is given with advantage in convalescence from gastric and intestinal inflammations.

HEART TONICS

The heart tonics of known value in equine medicine are digitalis and strophanthus.

Digitalis.—The leaves of the purple foxglove are the part of the plant chosen for medicinal uses. Dried and finely powdered, they are employed in veterinary practice. An infusion and a tincture are likewise made from them, and an active principle is obtained and known as digitalin.

Action and Uses.—A tonic effect upon the heart is claimed for digitalis, as it increases the force of its contractions while lessening their number. By stimulating the nerves which contract the blood-vessels a better tone is imparted to them, and the circulation is rendered more efficient. Strength is given to the feeble heart, and when irregular or intermittent, it is made to act in a steady and rhythmic manner. It is found to have a beneficial effect in horses for a short time, but its continued administration results in irritation of the stomach and inappetence. Poisonous doses act by causing spasm of the heart and consequent death from cardiac paralysis. Digitalis excites the kidneys to excrete a larger amount of urine than usual, and for this reason it is employed in the removal of dropsical swellings.

It is also given in combination with other drugs in cases of chronic cough, and with apparently beneficial results.

Strophanthus is the plant from which the arrow poison is derived, and its action in large doses is to paralyse the heart and other involuntary muscles. It is more soluble and rapid in its action than digitalis, but its effects are not so enduring. Continued administration, however, is less often attended with gastric disturbances. There are some cases of valvular trouble for which digitalis is unsuited, but in which strophanthus may be used with advantage.

HEART SEDATIVES

Remedies which diminish both the force and frequency of the heart-beats, thereby producing a soothing effect, are called heart sedatives. By their depressing effect upon the heart they may be said in a certain sense to weaken its action, and if given without judgment are very dangerous. In the case of plethoric horses with high temperatures, aconite is given to slow the heart's action, but is not persisted in. Aconite, hellebore, and antimony are the chief drugs of this class.

Aconite.—The monk's-hood (*Aconitum Napellus*) is the plant from which the Pharmacopœia preparations of this drug are made. They are aconitine—the active principle,—extract, tincture, liniment, and ointment.

Judging from the behaviour of horses, we may conclude that aconite applied to the more sensitive portions of the skin—the tongue and mouth generally—produces the tingling sensation so noticeable when brought in contact with similar parts on ourselves. The sensibility of the nerve ends being reduced by aconite, advantage is taken of the fact to employ liniments and ointments containing it with the object of allaying pain in acute rheumatism and painful swellings of various kinds, provided always that the skin is not abraded. When given internally, the effect upon the heart

can be detected, in the diminished beat of the pulse and reduced numbers of respirations, in a few minutes. It is given in inflammation of the lungs and acute abdominal troubles, and is a constituent of some colic medicines. Its action should be carefully noted, and its use discontinued as soon as the desired effect upon the heart is made apparent in the pulse.

DRUGS WHICH ACT UPON THE BLOOD-VESSELS

These are practically divided into two classes—namely, those which cause the vessels to contract and consequently permit a smaller amount of blood to pass through them, and those which dilate them and permit of a greater quantity to flow through them. When a portion of the body is in a state of active inflammation, we employ the first class of remedies. In veterinary practice we have frequent recourse to the cold douche, cold lotions, and bandages, ice, &c., for the reduction of inflamed joints and to control hæmorrhage.

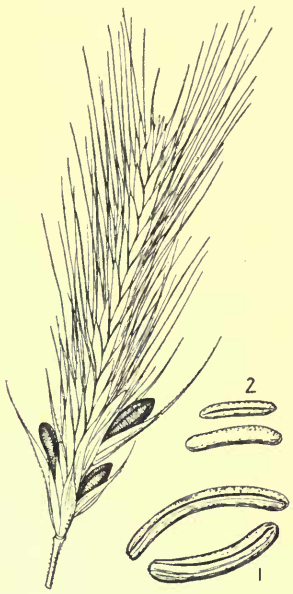


Fig. 429.—Ergot of Rye

1, Spanish ergot. 2, Russian ergot.

In the second class we place hot fomentations and poultices, mustard and warm embrocations, as their effect is to produce temporary dilatation of the vessels of the skin and enable the blood within to distend them to their greatest capacity. In this way mustard applied over the chest walls in pulmonary inflammations gives relief to the vital organs by diverting blood from them to the surface. Stimulating the legs with liniments, and hand-rubbing, has the same influence in bringing about a more general distribution of the blood, which in internal inflammation is centred upon some more important organ or organs.

In addition to the methods of relaxing superficial vessels as illustrated above, there are also remedies which have a like effect upon internal organs, and by bringing more blood to the part, increase their physiological activity. Among those used in veterinary practice may be mentioned ginger, capsicum, pepper, grains of paradise, and some others of doubtful value employed in the treatment of impaired digestion. Drugs which relax the vessels of the skin, as alcohol, nitrate of potash, acetate of potash, and nitrous ether, produce a sensation of warmth for a short time, and this is why alcohol is popularly believed to increase the warmth of the body, although it has already been shown that its ultimate effect is to reduce temperature.

The most recent and effectual remedies for dilating the blood-vessels all over the body are the nitrate of amyl and nitro-glycerine. The former has to be inhaled to produce its effect, and the latter is given internally. They are used for heart spasm (angina pectoris), and in asthma, broken wind, and convulsions. In poisonous doses paralysis of both motion and sensation results, and death by cessation of respiration.

We have now to consider those drugs which are credited with producing the opposite effects upon blood-vessels.

Ergot of Rye (fig. 429) is one of the most active drugs in causing contraction of the small blood-vessels in man and some of the domesticated animals; but its action upon horses is uncertain, and even in large doses its effects are not so marked as upon dogs. It probably has some medicinal value, and is therefore mentioned in this connection. It is thought by some to be the cause of abortion when taken as ergotized grasses, but experiments in which pregnant animals have been dosed with large quantities do not bear out the theory. It is given to mares after parturition, with a view to induce contraction of the womb, and has been recommended for inflammation of the coverings of the brain and spinal cord.

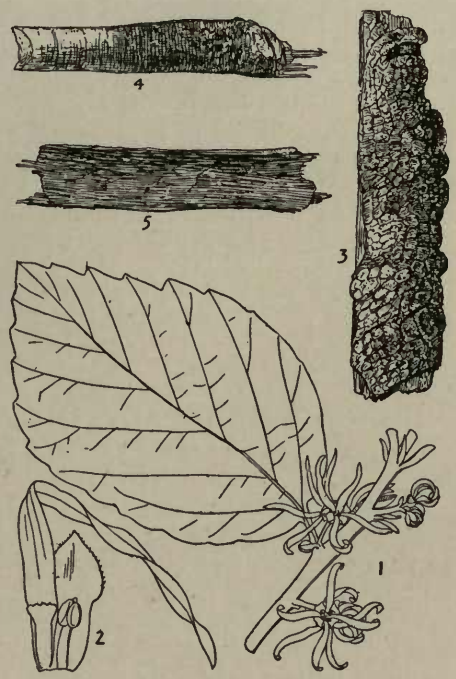


Fig. 430.—Witch-hazel (*Hamamelis virginica*)

1, Hamamelis (portion in flower). 2, Segment of flower. 3, Bark with cork. 4, Bark with cork removed. 5, Bark, inner surface.

Witch-hazel (*Hamamelis virginica*).—This is a shrub (fig. 430) growing freely in many parts of North America. From the flowers and dried bark are made the medicinal preparations in use. These are extract, powder, distilled extract, and ointment.

Uses.—For hæmorrhage, witch-hazel is used both as an external application and an inward remedy. It is applied as a lotion to arrest bleeding from wounds, and given for hæmorrhage from the lungs and abdominal organs. For piles in young foals it is an excellent remedy, and is employed both topically and internally. The dry extract, which has not been officially recognized in the Pharmacopœia, makes an excellent ointment for soft granulating wounds with a tendency to bleed. The dilute lotion is sometimes applied to inflamed eyes.

Lead.—As an external cooling and astringent lotion, lead, in the form of diacetate, or Goulard's extract, has long been recognized as a useful remedy by veterinarians. It is applied to ulcers, cracked heels, mallenders and sallanders, and in olive or linseed oil it makes an efficacious lotion for that eruption commonly known as "mud fever". It enters into several lotions and ointments for the treatment of grease. With glycerine it forms a glycerole of lead, and is applied in poultices and upon painful surfaces. Goulard lotion diluted with distilled water is a favourite application in the treatment of inflamed eyes.

Internally administered lead is powerfully astringent, affecting the mucous membrane lining the stomach and bowels. In cases of dysentery it has a soothing and healing effect upon the abraded surfaces of the bowel, and is given in conjunction with opium to arrest hæmorrhage in distant organs, as the lungs, kidneys, and womb.

It is readily taken up by all the tissues, and lead-poisoning is not uncommon among animals in the neighbourhood of lead-mines. (See Poisoning.)

DRUGS WHICH ACT ON THE STOMACH AND DIGESTIVE SYSTEM

All those organs concerned in digestion have need of consideration in this chapter, the stomach, the intestines, the liver, pancreas, and glands which are found in the intestinal walls. The effects of medicines of the class here to be described cannot be limited to a single organ, but are due to their action generally upon several parts of the complex system by which digestion is effected.

Remedies affecting the digestive system are divided into the following classes:—

DRUGS WHICH ACT ON THE STOMACH

Bitter Tonics

Gentian, Chamomile Flowers,
Calumba, Quassia,
Cascarilla, Serpentary,
Angostura, Peruvian Bark and preparations therefrom.
Cardamoms,

Artificial Digestive Agents

Pepsin, Hydrochloric Acid.
Inglovin,

Carminatives

Camphor, Aniseed,
Cayenne, Asafœtida,
Ginger, Carraways,
Peppermint, Fenugreek.

Drugs which Soothe the Stomach

Hydrocyanic Acid, Belladonna,
Bismuth, Cocaine,
Soda, Chloroform.

REMEDIES WHICH ACT ON THE BOWELS AND LIVER

Remedies for Constipation

Bran and Linseed Mashes, Olive Oil,
Linseed Oil, Glycerine,
Castor Oil, Sulphur.

Simple Purgatives

Epsom Salts, Cream of Tartar.
Glauber's Salts,

Drastic Purgatives

Aloes, Gamboge,
Croton Oil, Jalap.

Purgatives which Increase the Flow of Bile

Calomel, Euonymin,
Podophyllin, Aloes.

Remedies for Diarrhœa

Opium, Rhatany, Alum,
Catechu, Bael Fruit, Bismuth,
Kino, Oak Bark, Soda,
Iron.

Remedies for Flatulence

The Alkaline Bicarbonates, as,

Potash, Soda, Magnesia.

Essential Oils, as,

Mint, Aniseed,
Peppermint, Cassia,
Cloves, Carraway.

The Ethers and Spirituous Liquors, Ammonia, &c.

Remedies for Intestinal Worms

Anthelmintics

Areca Nut, Iron,
Male Fern, Nut-galls,
Powdered Glass, Kamala,
Kousso, Salt,
Santonin, Carbolic Acid,
Antimony, Quassia.

A consideration of the structure of the stomach and the process of digestion as carried on in it by means of the gastric juice and its constituents, aided by the mechanical movements and temperature of the viscus, controlled by nervous forces, will enable the reader to understand that drugs may be administered which, by their stimulating, or slightly irritating, effect upon the lining membrane, cause a determination of blood to the part, and consequently increase the production of gastric fluid, or cause an increase in the strength of the muscular contractions of the walls of the stomach, and a more active movement of the food contained in it. There may be sufficient, nay excessive, quantity of gastric juice produced, but it may be deficient either in pepsin or hydrochloric acid. If a general state of debility indicates such deficiency as the cause of indigestion, medicines are given with the object of supplying the want of the one or the other, until Nature again succeeds in secreting the desired quality or quantity. Stomachic stimulants are agents which have been found by experience to rouse the stomach from a state of torpor to greater activity, enabling it to perform its functions more rapidly and completely. The opposite condition of morbid irritability may be the cause of trouble, when the horse refuses to eat and eructations are observed; animals like the dog, in whom vomition is easily excited and performed, return the food almost immediately. In such irritable states of the stomach, gastric seda-

tives are desirable, as they reduce the irritability, and give rest to the glands whose office it is to secrete the juice.

Carminatives or **Ant-Acids** are those remedies which are employed to correct acidity of the stomach, a form of indigestion which is often persistent, causing pain and discomfort, which is more or less relieved by eructations from the mouth and the passage of gases from the bowel. Chronic "wind-suckers" often suffer in this way.

Bitter Tonics, by their action on the stomach, increase the flow of gastric juice and excite the nerves which regulate the muscular movements; the appetite is thus increased as well as the power of digestion. The bitter vegetable drugs most generally employed for horses are gentian, calumba, quassia, hops, chamomile, and cinchona. They may be given in the form of powder mixed in the food, previously damped, and to which a little table salt has been added. Most horses will take bitter drugs in this way, and if one refuses, he may be made to take them in the form of a ball, or a draught may be made of the infusion or extract. Some of these remedies have excellent effects in small doses, but prove hurtful if habitually used over long periods.

Calumba Root is one of our most valued drugs in flatulent forms of dyspepsia with loss of appetite. It is more likely to be refused in the food than some of the other bitters, and gives better results when used in the form of infusion and prescribed in conjunction with nux vomica and mineral acids. In the acid forms of stomach trouble it is combined with bicarbonate of soda with good results. The infusion must not be made with hot water, on account of the starch contained in the root, and must be quite fresh, as it is prone to rapid decomposition; but a tincture may be prepared which will keep indefinitely.

Cascarilla Bark and infusion or extract of **Chamomile Flowers** have the same effect as the remedies previously mentioned; but it is found that some individuals will not tolerate one kind of bitter, while they may derive much advantage from another—hence the desirability of considering a variety of tonics of this class.

Gentian Root is the favourite *par excellence* in veterinary practice, and appears to be beneficial where a stomach tonic is indicated. Most horses will take the ground root in their food, and it may be variously combined with the bicarbonates of soda and potash. It may be given as a recently made infusion, or the extract dissolved in water, or incorporated in a bolus.

Quassia.—Chips of quassia wood are infused and employed as a bitter tonic, more especially when intestinal worms are supposed to be the cause of digestive troubles. The infusion is also injected into the bowels to

MEDICINAL PLANTS—I

1. Hop (*Humulus Lupulus*):
   - *a.* Male flower.
   - *b.* Female flower.
   - *c.* Strobile.
   - *d.* Female flower enlarged.
   - *e.* Male flower enlarged.
   - *f.* Fruit enlarged.
   - *g.* Section of fruit enlarged.

2. Cardamom (*Elettaria Cardamomum*):
   - *a.* Raceme.
   - *b.* Cardamom.
   - *c.* Section of fruit and seeds enlarged.
   - *d.* Grain of Paradise (*Amomum Melegueta*) enlarged.
   - *e.* Section of Grain of Paradise.
   - *f.* Section of seed, natural size.

3. Quassia (*Picræna excelsa*):
   - *a.* Leaves and flowers reduced.
   - *b.* Male flower enlarged.
   - *c.* Hermaphrodite flower enlarged.
   - *d.* Cross-grained slice of wood (the "Quassia" of trade).

4. Cascarilla (*Croton Eleuteria*):
   - *a.* Branchlet.
   - *b.* Female flower enlarged.
   - *c.* Male flower enlarged.
   - *d.* Bark.
   - *e.* Cross section of bark enlarged.

5. Calumba (*Jateorhiza Calumba*):
   - *a.* Leaves and flowers reduced.
   - *b.* Male flower enlarged.
   - *c.* Female flower enlarged.
   - *d.* Rhizome and roots reduced.
   - *e.* Slice of root.

6. Gentian (*Gentiana lutea*):
   - *a.* Upper part of flower spike.
   - *b.* Fruit.
   - *c.* Part of rhizome.
   - *d.* Part of root.

MEDICINAL PLANTS—I

destroy certain classes of worms. Where a large dose is desirable the extract may be dissolved or given as a ball. Quassia is more irritating than any of the tonics previously mentioned, and does not suit all cases, but is used a good deal in large studs, where economy is a great consideration.

Cardamoms have a mildly tonic and stimulating effect upon the stomach, but are not much employed in equine medicines, as they are not only expensive but inferior to gentian, calumba, and quassia as tonics, and might with equal propriety be considered among those drugs called carminatives.

Hops. — As a veterinary drug, this valuable remedy has received inadequate attention at the hands of practitioners. As a stimulant to appetite it is not surpassed by gentian or any of the other drugs previously named. Where a restless watchfulness and irritability supervenes on such debilitating diseases as influenza, hops may be recommended as having a sedative influence upon the nervous system.

Cinchona or **Peruvian Bark** has been mentioned in connection with its chief alkaloid, quinine.

Acid Tonics.—"Acid Tonics" and the "mineral acids" are frequently referred to in other parts of this work treating of disease. They are an important class of remedies, and the chief of them in use for horse ailments are the following:—

Dilute Hydrochloric Acid,
„ Nitric Acid,
„ Nitro-hydrochloric Acid,
„ Phosphoric Acid,
„ Sulphuric Acid,
„ Sulphurous Acid.

Uses of Acids. — It will be inferred from previous references to digestion and digestive troubles that acids similar to those normally secreted will prove valuable when Nature's laboratory fails to produce them in sufficient quality or quantity. In the use of acids as an aid to digestion two factors should be borne in mind, viz., while acids increase the dissolving or digesting power of the gastric juice when food is in the stomach, they have the effect upon an empty stomach of retarding the secretion of natural acid; they should always therefore be given immediately after food and not before a meal. The seeming contradiction of giving alkalis in some cases where acid secretion is defective, is explained by the fact that those remedies excite activity on the part of the acid-forming glands. The converse effect is observed upon glands which produce an alkaline fluid, they being stimulated to action by acids, and

their secretion lessened by alkalis. From these considerations the reason for giving alkaline tonics before meals, and acids after them, will be obvious to the reader.

In the section on the physiology of digestion it has been explained how the fluids of the first portion of the duodenum act upon the partially digested food as it leaves the stomach, and here again the remedies under consideration continue their work. The continued employment of acids for a length of time is not desirable, as they may establish an artificial need for them, or result in catarrh of the stomach.

Besides the use of acids in various forms of indigestion, they are serviceable for their constringing action upon the lining membrane in cases of diarrhœa with a tendency to pass blood. Dilute sulphuric acid is generally preferred, or an old-fashioned aromatic acid in which ginger and cinnamon play a not unimportant part.

Sulphuric acid is given to arrest hæmorrhage in different organs, as the liver, kidneys, uterus, and lungs.

For all the purposes previously named it will be understood that the dilute acids of the Pharmacopœia are implied, the strong preparations being destructive caustics, and on account of this property being sometimes employed to remove warts and check the progress of malignant growths. If used as escharotics, care should be exercised in not allowing them to come in contact with healthy parts, or to burn the hand of the person making use of them.

DRUGS WHICH ACT ON THE LUNGS AND AIR-PASSAGES

The respiratory apparatus may be influenced in two principal directions by the administration of drugs, which may be divided into stimulants and depressants. The reader who would properly understand their *modus operandi* is referred to the chapter dealing with the physiology of the breathing organs.

It will be there seen that the minute blood-vessels of the lungs are spread over the walls of the air-vessels which constitute the parenchyma or lung substance in the form of a net-work, where it is brought into contact with the air inspired, or with gases accidentally or intentionally drawn into the lungs in the act of inspiration.

The diameter of the minute air-tubes is capable of being increased or diminished by their involuntary muscular fibres, while the larger tubes derive greater firmness from the presence of rings of cartilage which prevent them from being altogether closed under any circumstances.

The lining membrane of the air-passages contains mucous glands which secrete a bland fluid for lubricating and moistening the surface, and is further clothed with fine hair-like processes (cilia), which, waving gently, like a field of corn in the wind, carry any superfluous secretion to be expectorated along the bronchial tubes towards the larynx, whence it passes out by the nose.

The structure of the lungs facilitates the exchange of gases in the process of respiration, and this is largely regulated by the movements of the heart; upon its force and frequency the amount of work thrown upon the lungs will depend. A proper understanding of the subject is essential to the treatment of pulmonary diseases upon any rational basis. The confusion which exists in the minds of horse-owners and others as to congestion and inflammation of these organs arises from want of knowledge of the distribution of blood from the different sides of the heart, and its destination. Circulation of blood in the lungs is quickened by any agent which stimulates the heart. Remedies having this effect are referred to under the head of stimulants, as alcohol, ammonia, strophanthus, digitalis, essential oils, &c.

A stimulating effect upon the air-passages and the membranes which line them is produced by warm food and copious draughts of fluid. Some alkaline preparations, as acetate of ammonia, and other drugs, derived both from the vegetable and mineral kingdoms, have the effect of increasing the amount of secretion poured out from the respiratory surfaces when congestion has induced undue dryness.

Among the remedies that thus increase the amount of material in the air-tubes may be mentioned iodide of potassium, ipecacuanha, squills, camphor, turpentine, benzoin, balsams of Tolu and Peru, stramonium, &c.

Notwithstanding the disadvantage our equine patients possess of being unable to expectorate in the ordinary sense of the term, they yet derive great benefit from the class of remedies known in human practice as expectorants. The dryness of the membranes in cases of bronchitis may by their judicious administration be relieved, and the superfluous mucus got rid off by way of the nostrils.

By reducing the force and frequency of the heart's action, the circulation of blood in the lungs may be reduced in speed as well as volume, and for this purpose aconite is often prescribed. Counter-irritants, as mustard plasters, turpentine, and ammonia liniments, by withdrawing blood from the pulmonary vessels to contiguous structures, relieve the overloaded lungs, and aid in restoring the circulation to its normal condition.

In some chronic forms of disease, as in the bronchial catarrh of old horses, it may be desirable to reduce the activity of the glands and

diminish the output of mucus. Warm applications to the skin, and such drugs as opium, ether, chloroform, belladonna, and hyoscyamus, have this effect.

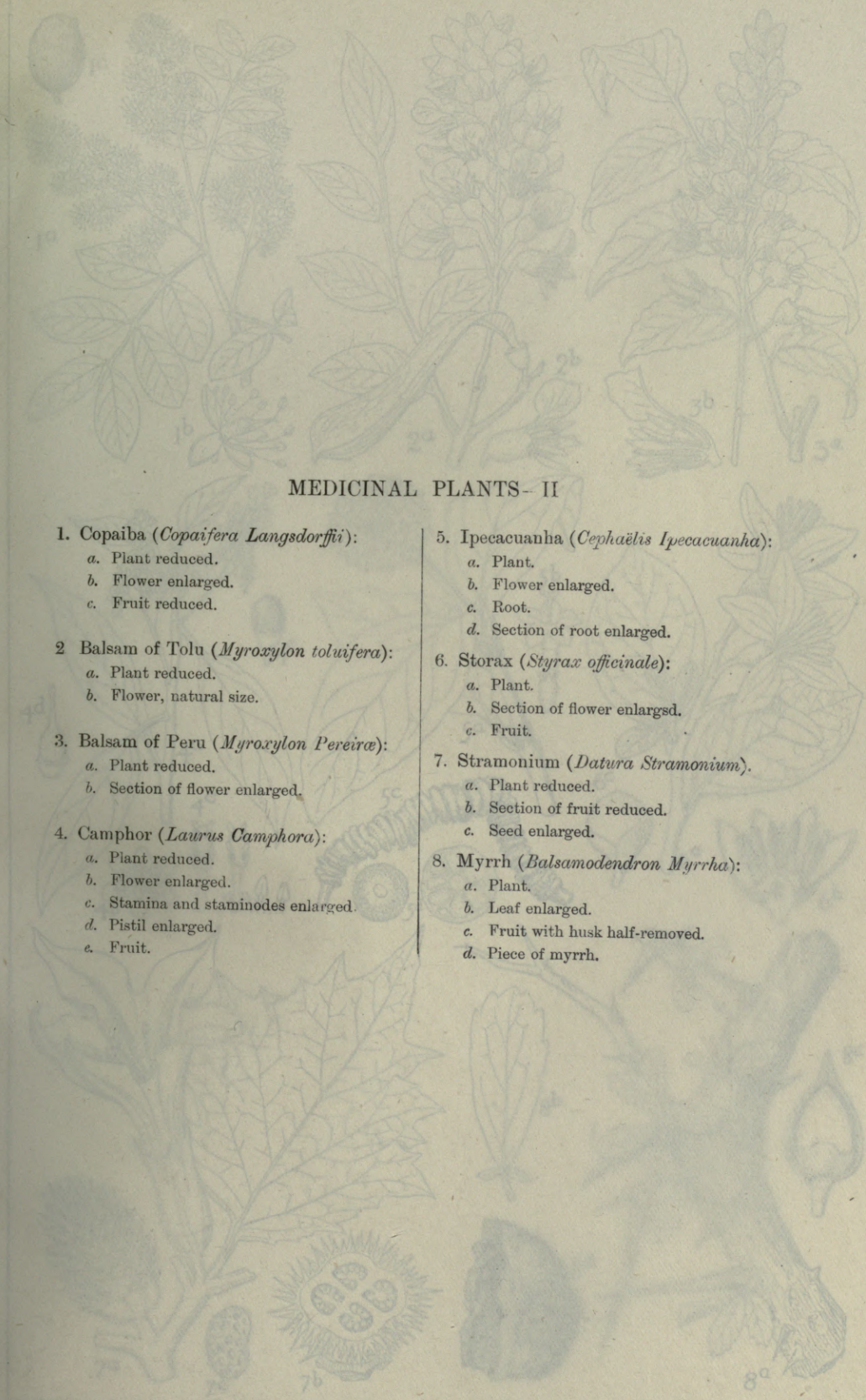
While remedies employed in the treatment of diseases of the air-passages and lungs are broadly divided into stimulants and sedatives or depressants, there are some which act in both ways.

REMEDIES WHICH STIMULATE THE LUNGS AND AIR-PASSAGES

Enough has already been said to show that all remedies which act as stimulants or tonics to the heart will strengthen the circulation of blood through the lungs. The symptom which most clearly points to the use of a lung or heart stimulant is a blue or purplish colour of the visible membranes, particularly the schneiderian.

In the acute stage of congestion of the lungs, when an indifferently-conditioned hunter is overtaxed, this blueness is very marked, and a judicious stimulant from the rider's flask may avert a dangerous illness. Ammonia, either given as a draught in water or inhaled, is one of the most effectual lung stimulants. The drugs elsewhere described as carminative have a quickening effect upon the circulation of blood in the lungs, and the stream appears to flow more freely as a result of such agents as unload the liver and bowels; very marked improvement often follows the administration of small doses of aloes and calomel, which in some indirect way have been proved by trainers to increase the respiratory power of the animals entrusted to them.

Expectorants may act, as previously suggested, by increasing the power of secretion and quantity of mucus, by loosening the too tenacious and insufficiently fluid matter, or by adding mechanical force to expel the accumulated material. There are coughs in which the animal is "too sore to cough"; a great desire exists, but the animal dares not yield to it because of the greater pain resulting. An expectorant which alters the character of the spit may make it possible, with much less effort, to get rid of the cause of irritation. In the treatment of horses we are somewhat restricted; we may not give an emetic, which is found in the dog to expel mechanically accumulated material in the bronchi. The relief thus obtained in so-called "stomach" coughs does not necessarily point to that viscus as the seat of disease, but rather gives proof of mechanical assistance afforded in the pressure forward of bronchial mucus, when, by the act of vomition the diaphragm is pressed against the lungs. While, as we have already indicated, expectorants act in a



MEDICINAL PLANTS- II

1. Copaiba (*Copaifera Langsdorffii*):
   - *a.* Plant reduced.
   - *b.* Flower enlarged.
   - *c.* Fruit reduced.

2 Balsam of Tolu (*Myroxylon toluifera*):
   - *a.* Plant reduced.
   - *b.* Flower, natural size.

3. Balsam of Peru (*Myroxylon Pereiræ*):
   - *a.* Plant reduced.
   - *b.* Section of flower enlarged.

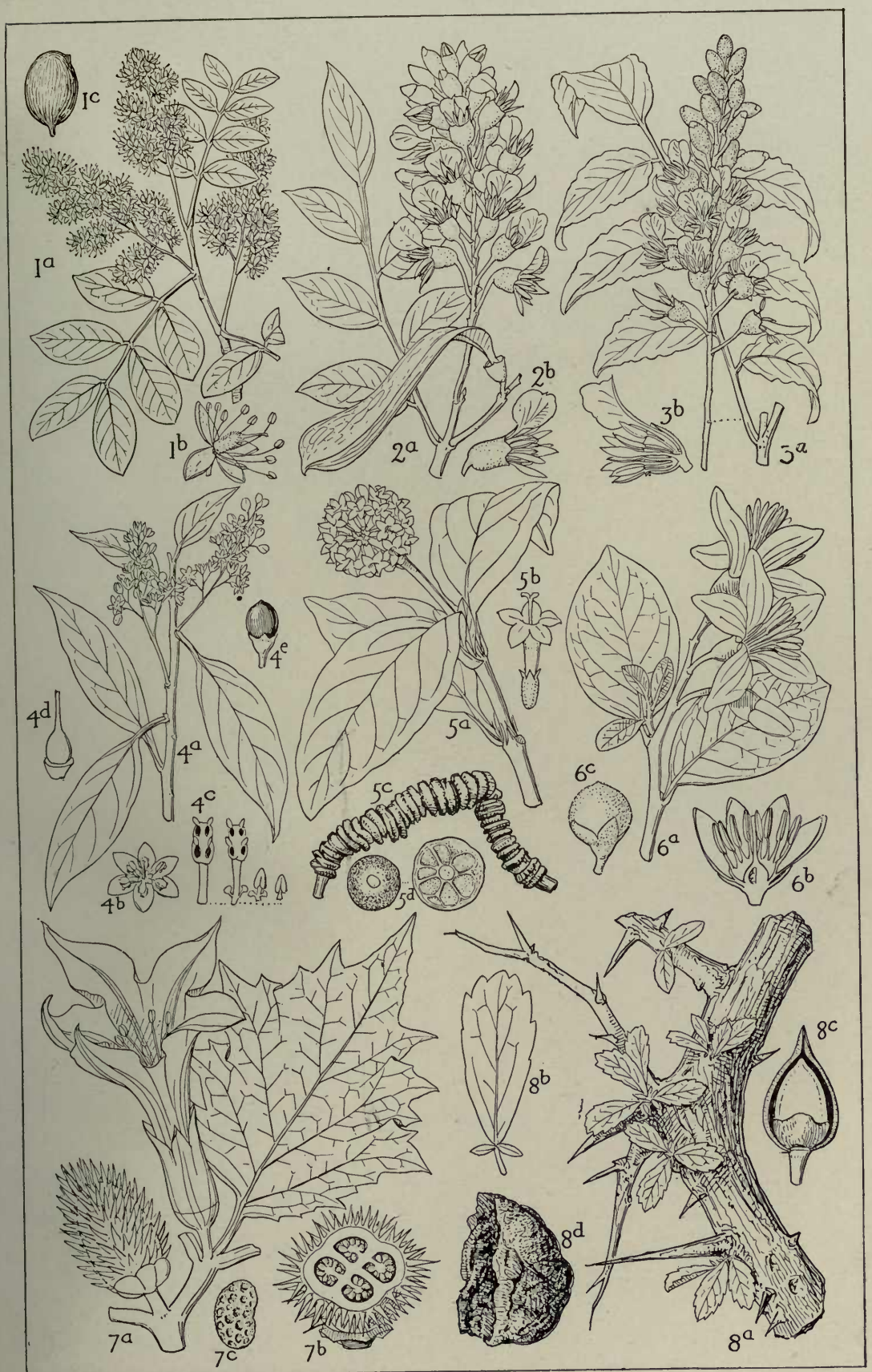
4. Camphor (*Laurus Camphora*):
   - *a.* Plant reduced.
   - *b.* Flower enlarged.
   - *c.* Stamina and staminodes enlarged.
   - *d.* Pistil enlarged.
   - *e.* Fruit.

5. Ipecacuanha (*Cephaëlis Ipecacuanha*):
   - *a.* Plant.
   - *b.* Flower enlarged.
   - *c.* Root.
   - *d.* Section of root enlarged.

6. Storax (*Styrax officinale*):
   - *a.* Plant.
   - *b.* Section of flower enlargsd.
   - *c.* Fruit.

7. Stramonium (*Datura Stramonium*).
   - *a.* Plant reduced.
   - *b.* Section of fruit reduced.
   - *c.* Seed enlarged.

8. Myrrh (*Balsamodendron Myrrha*):
   - *a.* Plant.
   - *b.* Leaf enlarged.
   - *c.* Fruit with husk half-removed.
   - *d.* Piece of myrrh.



MEDICINAL PLANTS—II

variety of ways, it may be said that their chief and most general action is to stimulate the circulation of the blood in the lining membranes of the air-tubes and produce an increased secretion. Inhaling the vapour of hot water is one of the most simple and effective means of producing this desirable action, and medicaments of various kinds are frequently added.

Of these may be mentioned the balsams of Peru and Tolu, copaiba and storax, camphor, myrrh, benzoin, and other volatile drugs, while for certain specific diseases agents are prescribed for inhalation for their antiseptic and other qualities rather than as pure stimulants or expectorants. Among this class, carbolic acid, turpentine, tar, eucalyptus, and other essential oils play an important part in the treatment of disease. Special apparatus is now made for giving inhalations, but in its absence the nose-bag may be made to do duty, with some hot bran and scalded hay, care, however, being taken not to scald the muzzle of the patient, as too frequently happens.

REMEDIES WHICH SOOTHE THE LUNGS AND AIR-PASSAGES

Reduction of the volume of blood circulating in the lungs is the most certain means of reducing their irritability, and a determination of blood to a particular part is combated by remedies which create a diversion from what are commonly called vital centres to the skin or subcutaneous tissues; hence the use of poultices and fomentations, warm liniments, and still more active vesicants, as mustard. The internal application of heat to the air-passages is afforded by the inhalation of steam, and the effect is to cause dilatation of the air-passages, more particularly of those with which contact is most direct. The effect of saline and other aperients is also soothing to the lungs for the same reason that a diversion of blood to the bowels relieves the pressure in the respiratory system. Another means of soothing the air-passages and reducing circulation of blood in the lungs is rest from all muscular exertion. It is noticeable in horses how cough is excited by movement and allayed by repose.

The circulation may also be lessened by such drugs as aconite, antimony, and ipecacuanha.

REMEDIES WHICH REDUCE EXPECTORATION

Removal of the cause of, or allaying, the irritability of the air-passages is to be desired, and the treatment for respiratory troubles is more generally dealt with under the heading of pulmonary diseases. It is, however, found that acid tonics in combination with such soothing agents as belladonna, hyoscyamus, camphor, and opium have the effect of reducing the

volume of, or drying up, the phlegm which is a troublesome symptom of chronic bronchitis.

REMEDIES WHICH RELIEVE SPASM OF THE AIR-PASSAGES AND COUGH

These, with our equine patients, are rather of a dietetic than medicinal order, although what may be called artificial aid is given by drugs in the alleviation of the spasmodic cough of chronic asthma or broken wind (see p. 11 of this volume). The chief of them are: arseniates of iron and copper, oils, fats, as suet and lard, and the sedative agents already referred to, namely, opium, belladonna, camphor, conium, lobelia, dulcamara, &c.

DRUGS WHICH ACT UPON THE SKIN

To enumerate all the drugs which act directly or indirectly upon the skin, when applied externally or administered internally, would be to name many of the agents in the Pharmacopœia. It will be understood, therefore, that this title is given to such as have a special or marked action upon the integument of the particular animal under consideration.

In the portion of this work dealing with the physiology of the skin, the great difference between human skin and that of the horse has been alluded to.

While the administration of certain drugs may be depended upon to have an almost certain effect in producing sweating in man, no such pronounced effect is seen in horses. "There is no drug", says Col. Smith, who has investigated the subject very thoroughly, "which produces sweating in horses." It must be understood, however, that this remark applies to visible perspiration. We cannot well believe that the insensible perspiration which is always going on is not materially influenced by drugs whose action upon the general condition of the skin has been well known to practical horsemen for ages. (See Alteratives.)

The importance of drugs acting upon the skin when externally applied is frequently alluded to in other chapters, as when blisters are applied over the seat of inflamed organs and parts of the body suffering from various forms of injury.

Drugs which are believed to increase the amount of sweat are called sudorifics or diaphoretics. Among them may be mentioned, as being most in favour with veterinary practitioners, acetate of ammonia, bicarbonates of potash and soda, camphor, ipecacuanha, antimony, and Dover's powder, which is a combination of opium, ipecacuanha, and potash sulphate.

Pilocarpine is said to have a diaphoretic action by some observers, but it is not in general use.

The want of a drug in veterinary practice which will make a horse sweat is not so much felt as medical practitioners sometimes imagine, since the equine patient can generally be made to perspire by the use of additional clothing and an increase in the temperature of the stable.

REMEDIES FOR EXCESSIVE SWEATING

These are usually to be sought in hygienic conditions rather than in the administration of drugs. When horses sweat unduly with only moderate exertion, it is usually a sign of weakness or want of condition. If any drugs are prescribed, those of the tonic class will be chosen.

Belladonna and atropine are believed to restrain sweating in horses, as they also do, and in a higher degree, in the human subject, but their use is only indicated under circumstances of disease.

DRUGS WHICH IMPROVE THE CONDITION OF THE SKIN

These have been dealt with at some length in the pages devoted to alteratives and tonics, more particularly in reference to those combinations of vegetable and mineral drugs which have so long enjoyed a reputation for conditioning.

DRUGS WHICH ACT UPON THE KIDNEYS, BLADDER, AND GENERATIVE ORGANS

In horse medicine this class is at once the most important and the most abused. Drugs which increase the amount of urine passed are called diuretics, and in the hands of the groom and carter have been productive of an incalculable amount of injury.

Diuretics are employed for so many purposes, and with such obvious results, that their popularity is easily accounted for. While increasing the actual quantity of fluid passed, they give relief to the kidneys by washing out the uriniferous tubes, and carrying away any accumulated mucus and fine saline particles which might eventuate in the production of calculi. They lower temperature and relieve the common symptoms of fever, and cause the removal of some of its products in the urinary discharges. In all diseases of the horse in which there is enlargement of the extremities and other depending parts from infiltration of fluid into the tissues, diuretics have a marked and immediate effect. In certain

diseased conditions of the integument, as grease, cracked heels, mud fever, as well as obstructions and inflammatory swellings in the lymphatic or other vessels, diuretics are of great value.

The abuse consists chiefly in giving diuretics to healthy animals with a view to saving labour and making the skin glossy. In this connection it may be well to remind readers that a horse's urine being thick occasionally, more especially when green food is substituted for dry, is not necessarily a symptom of disease—but the majority of grooms would seem to regard it as such.

The error is also frequently committed of giving diuretics to horses whose kidneys are already too active, and passing too much urine, with the common result that a harmless excess of secretion is converted into active disease.

The diuretic drugs most generally approved for horses are nitrate of potash (nitre), resin, soap, turpentine, spirit of nitrous ether (sweet spirit of nitre), balsam of copaiba, and the oils of juniper and aniseed. There are many drugs having more or less diuretic action, but the above list includes all those in common use and of well-proved therapeutic value.

REMEDIES WHICH SOOTHE THE KIDNEYS

Of an opposite class to diuretics are the remedies which suppress excess of function, and relieve the kidneys of pain and pressure by withdrawing blood from them and lessening the volume and rapidity of the circulation within them. When the kidneys are excited from any cause, the human practitioner is able to afford them direct and immediate relief by causing a free action of the skin. In order to "soothe the kidneys" the veterinary practitioner has to resort to large and frequently renewed cataplasms, and with these he incorporates emollients and sedatives, as belladonna extract, opium, or poppy-head infusions, hyoscyamus, hops, chamomile flowers, and possibly soft-boiled turnips or other "roots", as they are commonly called. To these measures he adds the frequent use of enemas of warm water and belladonna extract with glycerine. A very soothing effect is often apparent from this mode of internal "fomentation" when the precaution is taken by a good nurse to use the fluid at a correct temperature and cause it to be retained by holding the tail down. (See Administration of Medicines.)

DRUGS WHICH ACT ON THE BLADDER

These for the most part are such as act also upon the kidneys; but some few, as copaiba, and the balsams of sulphur, cubebs, buchu, and bear-

berry, appear, like nux vomica and its chief alkaloid (strychnia), to have a tonic effect upon the muscular layers of the bladder, aiding it to contract and expel its contents when from various causes there is difficulty in doing so.

REMEDIES WHICH ALLAY IRRITABILITY OF THE BLADDER

The situation of the bladder renders it rather improbable that remedies applied externally directly affect it. It is nevertheless common practice to endeavour to influence it by application to the loins of poultices, blisters, and various other medicaments. Drugs internally administered have great effect upon the bladder, and should be given in bland fluids, as linseed tea, milk, barley-water, &c. Opium and belladonna are found to have the most soothing effect, whether administered in the form of draught or pessaries introduced into the canal.

REMEDIES WHICH ACT UPON THE GENERATIVE ORGANS

In this connection there is little to be said. Cantharides has often been known to excite both male and female animals sexually, and its abuse has induced many cases of bloody urine and strangury, inflammation of the kidneys, and even death.

Iodides have in some instances caused wasting of the testicles, and in the mare, to savin and ergot abortion has been attributed. Only in poisonous doses does the former so act upon the uterus, and the latter appears to be quite innocuous if we are to accept the conclusions of conscientious experimenters. It is probable that the tendency of ergot to diminish the calibre of the small blood-vessels and contract involuntary muscles may have some modifying influence upon the uterus in cases where labour pains or straining continue after parturition. Opium has also the effect of a sedative or anodyne upon the womb of the mare in cases of inflammation or undue excitement following upon foaling. Cocaine injected in solution, or introduced in form of pessary, also stays those expulsive efforts which too often result in inversion of the uterus, but its influence is very evanescent, and it is best employed as a temporary remedy while opium is gaining control of the parts implicated.

DRUGS WHICH ACT UPON THE NERVOUS SYSTEM

If the reader has studied the part of this work dealing with the distribution and function of the nerves, he will understand that the whole animal machine depends upon them to keep its various organs working together in harmony and sympathy one with another. The question as to what drugs act upon the nervous system can only be answered in a limited sense. It is probable that no drug can act without its aid, but there are special agents which experience and experiment have demonstrated to have a particular and well-marked action on nervous tissue, and to these we give the title which appears above.

If we desire to affect a particular nerve or branch, we cannot select an agent that will speed like an arrow to the spot indicated and affect no other, but we must seek to obtain the desired effect through the medium of the blood. The agent will have to be taken into the circulation, and there will be distributed over the nervous system in an equal degree.

HYPNOTICS OR SOPORIFICS

Drugs which conduce to sleep are called by the above names, and their action upon man is fairly uniform except where some special idiosyncrasy exists; but with regard to horses we are not so well informed. They are light sleepers as a rule, and in health seldom repose for longer than four or five hours. The nervous temperament of the animal does not permit him to abandon himself to that complete oblivion which is a more or less acquired habit by civilized man enjoying perfect security of life. Drugs which have a soothing influence upon the nervous system, and invite sleep rather than compel it, are called by the above names, but those which overpower the brain and master the inclinations are known as Narcotics. The same agent may act as a gentle soporific in small doses and as a powerful narcotic in large ones. Drugs which relieve pain conduce to sleep, the anodyne effect of opium having been understood perhaps longer than that of any other drug.

Chloral Hydrate, although discovered by Liebig in 1832, did not come into use in this country until quite thirty years later, and its value in veterinary medicine was not ascertained until some years after the medical profession had proved its efficiency as a therapeutic in human practice.

It is extremely distasteful to horses owing to the hot burning sensation it imparts to the mouth, and in a lesser degree to the skin also, while it acts as a powerful irritant to abraded surfaces.

It is an antiseptic, and in the proportion of one hundred grains to the pint of water prevents decomposition. It has not the constipating effect of opium, and is a more direct spinal sedative.

Dose.—From three to six drams, but larger ones can be given with safety. Excessive doses produce profound slumber, complete insensibility, and shallow breathing. The pulse, though at first quickened, becomes soft and indistinct, the pupils are contracted, and complete muscular relaxation is also observed. In poisonous doses death results from reduced temperature and paralysis of the heart. The smaller animals can be recovered from excessive doses by stimulants and the application of hot-water bottles, blankets, bandages, and friction to the skin. The same measures, so far as they can be applied to so large an animal as the horse, would be available in case of an overdose.

It is given to horses in the treatment of meningitis and other irritable conditions of the spinal cord and nerve-centres, and by some it is used as an ingredient in colic mixtures. Its effect in cases of spasmodic contraction of the bowels is produced through the medium of the nerves by which they are supplied, but chloral is not considered to be an anodyne in the same sense as opium.

Bromides of Potassium, Sodium, and Ammonium.—These salts of bromine, with a base of either of the above, are used where a soporific or mildly-sedative action is desired. The large dose required, an ounce or more, to produce any marked effect, and the considerable cost of the drugs, are practical objections to their use in veterinary practice, while it is probable that better results can be obtained from smaller doses of chloral hydrate.

NERVE TONICS AND STIMULANTS

These terms are applied to drugs whose action improves the nutrition of nerve-substance, and thus strengthen and brace up the nervous system generally.

In our patient, the horse, we have not those hysterical conditions and obscure nervous diseases to deal with that have called into existence a number of specialists among human practitioners, yet it may be said that of all domestic animals the horse is the most "nervous" or excitable. From a variety of causes he is liable to become "run down", and a nerve tonic or stimulant is often the remedy most calculated to pull him up again.

It has been observed during recent years that the symptoms of nervous collapse have been very marked in most of the attacks of so-called influenza. The close observer, brought up among horses and familiar with their habits and expressions, can hardly doubt that they suffer from nervous

headache and depression of spirits at times, giving rise to sleeplessness, timidity, and other indications of cerebral disturbance, and there can be little doubt that many of those sudden periodical changes of temperament and habit frequently observed in horses, and attributed to vice, have their origin in disorders of the nervous system.

Nux Vomica.—This drug, or its alkaloid, strychnia, has been long in repute among veterinarians. It is employed in the form of powdered seeds, or "nuts" as they are called, extract, and strychnia in solution. The more elegant preparations, as Easton's syrup and various citrates, are sometimes employed, but are not in general use for horses.

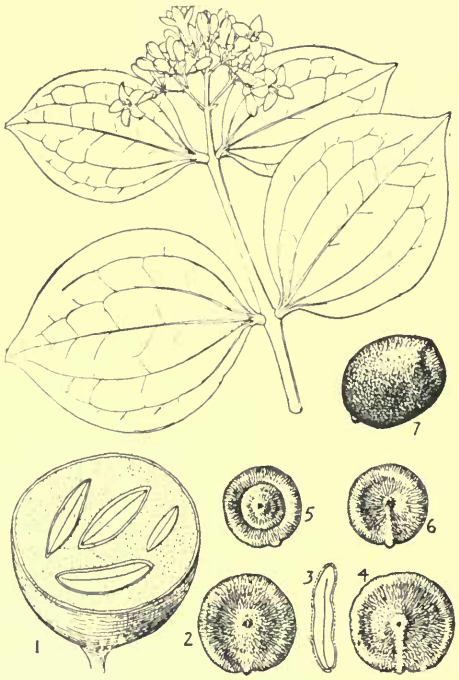


Fig. 431.—Nux Vomica (*Strychnos nux vomica*)

1, Section of fruit. 2, Seed (Ceylon). 3, Section of seed (Ceylon). 4, Seed showing ridge (Ceylon). 5, Seed (Madras). 6, Same seed showing ridge. 7, Seed of *Strychnos ignatii*.

Actions and Uses.—The intense bitterness of this drug does not usually debar us from prescribing it, as few horses object to it. It is often advantageously combined with the simpler vegetable bitters previously referred to as stomach tonics; it may also be given with iron or alkalies. When prescribed with acids, the liquor strychniæ is advised. The use of the drug is seldom pushed to extremes with horses, although with man, and the dog also, in certain forms of paralysis, it is administered until slight spasmodic movements in the voluntary muscles are observed. In excessive doses violent muscular contractions, sometimes resulting in general rigidity of the body, are induced. Its action on the bowels renders it a valuable medicine in some forms of constipation arising from imperfect innervation, more particularly in the case of old animals, or the subjects of chronic functional disease of the alimentary canal. After long-continued use the system becomes more and more indifferent to its action, and is less affected by it than at first. It is for this reason advisable to begin with a small dose and increase it gradually if the course of treatment is to be a long one. Or it may be desirable to discontinue its use for a time and resort to it again.

It is one of the drugs used by grooms who "travel" stallions, as it imparts tone to the system and sustains sexual desire.

ANÆSTHETICS AND ANODYNES

These are certain drugs which so blunt the senses that little or no pain results from causes which in their absence induce it. They have a local or general effect according to the mode of application. Some, as cocaine, veratrium, and aconite, when applied to the skin, deprive the nerves of the part of sensation, so that they may be cut or even burned without causing pain at the time. This action is called local anæsthesia, and the agent employed, an anæsthetic.

Ether spray or other applications producing intense cold by rapid evaporation have also the effect of producing insensibility, but experience has proved that this method of producing anæsthesia is sometimes attended with after consequences of a very undesirable character. Evaporating lotions, composed largely of the cheaper forms of spirit, are frequently prescribed to reduce pain in inflamed limbs, tendons, and joints, their effect being the result of the cold induced in the part. The application of ice and ice-water is attended with similar results.

Fig. 432.—Opium Poppy (*Papaver somniferum*)

1, Capsule showing Turkish method of incision to get opium. 2, Seed. 3, Section of seed.

General Anæsthesia is produced by the inhalation of drugs such as chloroform and ether, and the same end may be attained by introducing them into the blood either through the stomach or by subcutaneous injection. These agents, by acting on the brain and spinal cord, induce sleep and insensibility to outward impressions and inward pain, and in the latter connection rank with that class of agents termed anodynes. Given in certain doses, they soothe the whole body and reduce the activity of different organs; then they are classed as sedatives. Since their effect is also to relieve spasm, they are known as anti-spasmodics.

Opium and its Alkaloids.—At the head of the list stands opium, where Percival, the father of veterinary medicine, placed it, and described it as "the sheet anchor of the veterinarian". Its method of production need not be described here.

Opium as imported is a blackish-brown, pasty-looking substance. The chemist is able to separate from it some nineteen or twenty alkaloids, of which the chief are morphia and codeia. The preparations used in veterinary practice are the gum, the powder, tincture (laudanum), morphia, and occasionally codeia.

When an aqueous preparation is required the extract is rubbed down with hot water. The compound tincture (paregoric elixir) is also sometimes prescribed.

The chief method of administering morphia is by subcutaneous injection. This course is adopted as a matter of convenience, and not, as in the human subject, to avoid those derangements of the stomach and bowels which so commonly follow its use when given by the mouth.

Fig. 433.—Belladonna (*Atropa Belladonna*)

1, Corolla opened. 2, Pistil. 3, Fruit. 4, Section of fruit.

Action and Uses.—Externally the tincture and extract of opium are used to allay pain, and it is generally believed that greater anodyne effects are produced upon an abraded surface than when applied to an unbroken skin. In inflammatory œdema, and sprains to tendons, joints, and contusions, its application in conjunction with acetate of lead and spirit of wine has long been resorted to on account of its soothing and sedative properties.

Internally administered, opium affects horses in different ways and in proportion to the dose. In small doses it is a stimulant. Long continued it becomes astringent and induces constipation, although a medium dose be employed. Its effect in controlling pain and spasm of the intestine has been recognized for ages. It is also employed in diarrhœa and other diseases in which purging is a prominent symptom.

Large doses are sometimes given to restive horses that will not submit to operation, and that for special reasons cannot be submitted to other forms of restraint; and in a few instances only is the same degree of excitement observed to follow its use, as marks its immediate effects on man.

Belladonna, and **Atropia**, its active principle, belong to the same class of anodyne and sedative drugs as opium, and may be alternated

with or used in conjunction with it. Besides allaying pain and spasm when externally applied or internally administered, it would seem to be specially beneficial in its action upon the organs of vision and upon the urinary and generative apparatus. The pupil of the eye is dilated, either by internal doses or the more convenient method of dropping a solution of atropia on the surface of that organ. In some diseases in which the iris is liable to become fixed to adjacent parts under conditions of inflammation, this is prevented by causing the pupil to be dilated and removing the iris from contact with the structures referred to.

Opium has the contrary effect, and causes the pupil to contract.

In irritability of the bladder and kidneys belladonna is found to be a valuable drug, controlling pain and inducing normal secretion, while its properties render it of great value when injected into the uterus of mares after painful labour or inflammatory action from eversion or other accident.

The preparations of belladonna used in equine practice are the extract, tincture, liniment, and plaster.

Atropia, its active principle, is invariably employed in solution, either as drops for the eyes or for subcutaneous injection.

Hyoscyamus or **Henbane** is a drug of like therapeutic effect to belladonna, but not in general repute among veterinarians. It may, however, be employed with advantage in the few cases where some idiosyncrasy brings disappointment to the prescriber who has given belladonna. Its action is invariably milder and the results apparently better when given in combination with some other sedative.

Tobacco.—This powerful narcotic is more in favour with amateur horse doctors than with veterinary surgeons. The manufactured tobaccos are very variable in medicinal power, and when required as a drug Virginian shag is usually selected, as containing more resinous and albuminous matters, which in other kinds are more or less removed by partial fermentation.

Action and Uses.—Externally applied it is more or less irritant. Internally it causes muscular relaxation, and in this way acts as an antispasmodic in bowel and other affections.

An infusion of it is employed for the destruction of external parasites, and is often applied in conjunction with sulphur in cases of mange.

It is sometimes given to destroy worms in the intestines, and a small plug of it introduced into the rectum with the view of getting rid of "fundament" bots and other parasites which infest the terminal portion of the bowel. Tobacco smoke injected into the rectum by means of suitable apparatus appears to give relief in some cases of colic.

Grooms and other horsy persons introduce tobacco into the sheath of horses and the vagina of mares under the impression that it incites them to urinate. If it does so, it is only by its local irritant effect upon the parts.

Indian Hemp (*Cannăbis Indica.*) — In veterinary practice this potent drug was first used by veterinary surgeons serving in India, and would long since have been brought into general use but for the variable strength in which it is produced, and the consequent uncertainty of its action.

Fig. 434.—Indian Hemp (*Cannabis Indica*)

1, Male flower. 2, Female flower. 3, Perianth unrolled. 4, Fruit. 5, Longitudinal section of fruit. 6, Cross-section of fruit.

Fig. 435.—Calabar Bean (*Physostigma venenosum*)

1, Pistil. 2, Appendage to style. 3, Bean. 4, Long section of bean. 5, Cross-section of bean.

Its action is antispasmodic, anodyne, and in large doses powerfully narcotic. It is usually prescribed in the place of opium, or in combination with chloral and other sedatives. In controlling cerebral excitement it stands higher than opium, and its effects are more lasting than those of chloral. In experiments made upon healthy horses, it was observed that some few of them manifested a preliminary period of excitement so common to the human subject when under its influence.

Calabar Bean.—This product of the Niger and Old Calabar river was known to the natives as a poison long before Europeans thought to apply it to medicinal uses.

Its action is that of a powerful sedative to the spinal cord, allaying its excitability, paralysing voluntary muscles, and reducing the sensibility of the skin. It has been found to control the spasms of tetanus, and its active principle, eserin, is employed to contract the pupil of the eye in opposition to belladonna or atropine, when, as has already been pointed out (see Belladonna), it is desirable to keep the inflamed iris from contact with parts to which it may adhere.

In cases of impaction of the bowel, it has the reputation of exciting peristaltic action and facilitating the removal of the offending matter more quickly than any other agent.

Hemlock (*Conium maculātum*).—The "hemlock rank", which the cow is recommended in our nursery rhymes not to eat when "growing on the weedy bank", was a favourite poison with the ancients, and the one by which Socrates cut short his useful life. It is not much used as a horse medicine, although under some circumstances it is known to produce very powerful effects upon the animal.

Cocaine, the active principle of Coca or Cuca, has proved a great boon to the veterinary practitioner, and especially in connection with surgical operations, which have not only been rendered easy of performance by it, but have also been deprived of much of the danger that used to attend them.

A four-per-cent solution dropped into the eye enables one to examine it, and remove any hay seeds or other foreign bodies, while the anæsthetic effect may be continued long enough to perform many operations. Injected under the skin, firing and cutting operations can be performed with a minimum of pain and restlessness on the part of the animal.

ANTISEPTICS

Antiseptics are agents which either arrest or prevent putrefaction or decomposition. The word is derived from two Greek words—*anti*, against, and *sepene*, to rot. Decomposition, in the sense here understood, is due to the presence of minute organisms, and true antiseptics, being inimical to their existence and multiplication, render its occurrence impossible.

By the employment of these agents in one or another of their various forms, surgery, both in its application to man and the lower animals, has been revolutionized. Not only by their use have operations which formerly resulted in great mortality been stripped of their danger and rendered safe, but others of a more formidable and important character have been rendered possible and in a large measure successful. So much

so, that there is at the present time hardly an organ in the body to which the surgeon's knife has not safe access, and whose disease it does not challenge.

In the use of antiseptics for surgical purposes, they are not only freely applied to wounds, but also to the instruments to be used in operating and the hands which use them, and may be also to the air of the apartment in which operations are carried out.

Surgeons distinguish between agents which merely prevent the development of pathogenic organisms and those which actually destroy them.

One of the most valuable antiseptics is carbolic acid.

Carbolic Acid.—This is a product of the distillation of coal-tar, and is chemically known under the several names of phenic acid, phenol, and phenylic alcohol. The colourless, needle-shaped crystals of pure carbolic acid are not convenient for surgical purposes unless broken down with glycerine or some other solvent. A comparatively impure acid is equally efficacious, and in general use more economical and convenient. The preparations of value to the veterinarian are glycerine of carbolic acid, carbolic lotion, carbolic ointment, and carbolic oil.

Carbolic acid is both a disinfectant and an antiseptic, and though only mixable with or soluble in water to a small extent, it can be made more so by the addition of glycerine, and is then employed in different proportions for a great variety of purposes. Strong solutions destroy living organisms, while dilute preparations merely prevent their growth. Besides being an antiseptic, carbolic acid is also a caustic when applied undiluted to the skin, leaving a white mark as evidence of the superficial layers being destroyed. Acute pain is felt at the moment of application, but the sensibility of the integument is subsequently diminished.

It is a valuable agent in the treatment of ulcers, cracked heels, and such diseases. Ringworm and other affections having their origin in low forms of life are successfully combated with strong carbolic applications, which are mostly made in the form of an ointment. Some forms of skin irritation are allayed by weak lotions of carbolic acid, while the mange mite and other external parasites are either immediately killed by it or caused to quit the body of their host.

Applied internally, it is a safe and useful agent in the treatment of those ulcerative conditions which affect mucous membranes, more especially those of the nostrils, mouth, throat, and other parts accessible to the surgeon.

The fœtor of the breath arising from dental troubles, and referred to at some length, is subdued by a suitable mouth-wash in which carbolic acid is the active ingredient.

It is occasionally employed as an inhalation in certain forms of catarrh in which malignant sore-throat is a prominent symptom.

Carbolic acid is prescribed internally in some instances where the production of gases from fermented ingesta is a direct cause of flatulent colic and other intestinal troubles.

Sulpho-carbolates of Soda and **Zinc** are products of the union of sulphuric and carbolic acids with bases of the metals sodium and zinc.

Sulpho-carbolate of soda, as an internal remedy, is particularly adapted to those fermentative conditions of the stomach and bowels referred to in the last paragraph. It appears to have all the antiseptic advantages of carbolic acid without its irritative effects. The sulpho-carbolate of zinc is chiefly used as a dressing for wounds. In addition to its antiseptic properties it has a beneficial action in the repression of too profuse granulations or "proud flesh".

Resorcin, another product of fractional distillation of coal-tar, is in its action very similar to carbolic acid, but possessed of other properties not yet fully understood.

It has been used by veterinary surgeons only for a short time, but is highly spoken of by them in the treatment of wounds, and for the prevention of fermentation in the stomachs of animals which have gorged themselves with food.

It is thought to be an antipyretic, because it produces copious perspiration, followed by reduction of temperature.

Creasote is another, and one of the oldest, of coal-tar distillations used in medicine. Inhaled, it is quite as effectual as carbolic acid, and much safer.

As an ointment, it is destructive of parasitic life without unduly irritating the skin of the patient, and as an antiseptic dressing it is also a useful agent.

Boric or **Boracic Acid** is a mild antiseptic, and frequently employed as a mouth-wash where the stronger agents above mentioned might prove too irritating or productive of nausea. As a lotion it is used for wounds and saddle-galls, and, in combination with oxide of zinc and flour, to check the spread of ulcers and dry up raw surfaces which cannot be protected by mechanical appliances.

Sulphurous Acid is the gas that is set free by burning sulphur. It is an old-fashioned disinfectant of great potency, and occasionally prescribed as an inhalant in place of those referred to above. Dissolved in water, and of certain strength, it retains the same name, and further diluted forms a valuable lotion in the treatment of ringworm, grease, and thrush. It is but rarely employed as an internal remedy, its action being very similar to

carbolic preparations, but not as effectual in arresting the disengagement of intestinal gases.

Permanganate of Potash.—With the exception perhaps of carbolic acid, this very beautiful product of the chemist's art is in more universal demand than any other remedy of its class. Its purple crystals are readily soluble in water in any proportion required, and its virtues depend upon the large proportion of oxygen which it contains and readily gives up to unite with and destroy organic substances.

Condy's Fluid, so generally prescribed, is said to be composed of two grains of permanganate of potash to each ounce of water, but the makers have denied the statement. It is, however, believed that sodium is the alkaline base of the salt, and it is for all practical purposes the same as potash in its action.

The annexed table, showing the relative activity of various disinfectants, is copied from *The Household Physician*, and justifies the high regard in which permanganate of potash is held:—

1 part of carbolic acid in	1,250	parts of water hindered the growth of the organism.
1 part of boracic acid in	1,250	„ „
1 part of chlorine in	1,500	„ „
1 part of eucalyptol in	2,500	„ „
1 part of camphor in	2,500	„ „
1 part of permanganate of potash in ...	3,000	„ „
1 part of oil of cloves in	5,000	„ „
1 part of peppermint oil in	33,000	„ „
1 part of thymol in	80,000	„ „
1 part of corrosive sublimate in ...	1,000,000	„ „

It will be seen that one grain in 3000 of water is capable of hindering the growth of organisms.

Iodoform.—A yellow crystalline powder, in which iodine, carbon, and hydrogen combine to form a valuable compound, with a somewhat offensive odour and powerful antiseptic properties. In horse practice it is used in the treatment of foul ulcers and unhealthy wounds. In cases of ozena it is injected up the nostrils by means of an insufflator. Mixed with oxide of zinc, flour, and other diluents, it is dusted over abraded surfaces and injured tissues as a preventive of putrefaction where septic influences are known to be at work.

Perchloride of Mercury.—A solution of this substance, which is commonly called corrosive sublimate, is the most powerful antiseptic known to science, and, freely diluted (see the table above), is employed as an antiseptic agent, and also in the preparation of instruments and appliances for surgical operations. It is injected into the various cavities of the

body, applied as a lotion externally, and used in the preparation of lint gauze, cotton, and other antiseptic dressings. For disinfecting purposes, the strength recommended is from 1 in 1500 to 1 in 10,000 parts. Four grains in a quart of distilled water is the proportion commonly employed for washing the hands and appliances to be used in operations.

It was largely due to Dr. Koch that this agent to a great extent supplanted carbolic acid, as that eminent bacteriologist made the most exhaustive experiments upon the anthrax bacillus and other deadly organisms, and found it to be the most efficient of the many antiseptics then in use. It may, however, be stated here that Lister, the father of antiseptic surgery, has gone back to his first love, and recently declared his preference for carbolic acid as a surgical dressing.

Fig. 436.—Eucalyptus globulus
1, Section of unopened flower. 2, Anthers.
3, Section of fruit.

Eucalyptus.—An essential oil from the blue gum-tree, is regarded as an antiseptic, and is in favour where insanitary conditions predispose horses to fever and impart an unhealthy condition to wounds. Septicæmia, strangles, influenza, and purpura are among the diseases in which eucalyptus is advantageously employed for disinfecting purposes, both by inhalation and as an outward application.

Thymol is a crystalline substance derived from oil of thyme, but has not been used to any extent in veterinary medicine.

Menthol is another concrete volatile oil but seldom found in the veterinarian's pharmacy. It is, however, a powerful antiseptic, and may be substituted for iodoform where the odour of that drug is particularly objectionable.

Sanitas, so much appreciated in great studs and horse repositories where a disinfectant and deodorizer are both in request, is a proprietary preparation, its properties being due to eucalyptus and a species of pine oil.

Chlorine Gas is one of the oldest and most efficient of disinfectants, which has been displaced by changing fashion rather than from any failure to serve its purpose. In the convenient form of supersaturated lime-chloride,

or, more strictly speaking, chlorinated lime, it may be sprinkled upon stable floors or placed in vessels about the building. Where the disinfection of unoccupied stables is the object to be attained, a more effective method is that of mixing common salt, binoxide of manganese, and sulphuric acid in a suitable vessel, closing the doors and windows, and allowing the chlorine gas evolved to permeate the whole structure. It has the disadvantage of irritating the air-passages of living animals, and damaging brass and other stable-fittings; reasons which, in a measure, account for so effective an agent having fallen into desuetude.

Burnett's Disinfecting Fluid is a strong solution of chloride of zinc. Antiseptic and disinfectant, correcting the fœtor of ulcers and unhealthy wounds, but retarding the formation of new material to such an extent that it is in more frequent request for other purposes, such as the destruction of fistulæ, proud flesh, and morbid growths.

MISCELLANEOUS DRUGS

Mercury (Quicksilver).—Mercury is a liquid metal, and in various forms of chemical combination is largely employed in veterinary medicine in both internal and external disorders. The preparations used in the treatment of horses are calomel, bichloride or perchloride of mercury (corrosive sublimate), gray powder, blue pill, red and white precipitate, nitrate of mercury, iodide and biniodide of mercury, yellow oxide of mercury, mercurial ointment, oleate of mercury, &c.

Action and Uses.—As an external remedy mercury is used for various skin diseases, particularly those caused by parasites, both animal and vegetable. The blue ointment, which is simply a mixture of mercury and lard, with a small proportion of suet to harden it, was formerly very much used, but at the present time has given place to the cleanlier preparations of ammoniated mercury, the red oxide, and the nitrate, while the red iodide or biniodide, as it is respectively called, is the material most used in blisters, and was originally introduced as a substitute for firing.

The bichloride or perchloride (the change of nomenclature gives rise to confusion, and we therefore use both terms) is an invaluable chemical for the destruction of external parasites, as well as those minute organisms which are now regarded as the cause of so many specific contagious diseases. Besides its medicinal use it is employed as an antiseptic for the sterilization of instruments, and the hands of the operator in the course of surgical operations. Calomel is the chief salt of mercury given to horses. It is not, however, in great favour. As a liver stimulant it is largely employed in human and canine medicine, but in the horse it is feared on account of

its sometimes drastic effects. That it is valuable as an alterative is, however, a matter of common knowledge among those who have the care and conditioning of horses for fast work.

Though the action of mercury upon the system is obscure, it is nevertheless marked. It is absorbed from the blood by every tissue of the body, and to produce its constitutional effects it is frequently prescribed in the form of solution of the perchloride. It influences nutrition in some obscure way, and excites absorption of various morbid deposits. When given over a long period it tends to accumulate in the system, and to prejudicially influence the health of the animal, and can be found in the tissues after death. Inflammatory deposits are caused to be absorbed by it, and it was one of the remedies used in the coaching days when glandered teams were kept at work by the use of such drugs and enabled to enjoy a certain measure of health.

Mercurial poisoning is generally spoken of as salivation, because the first prominent symptom is a profuse discharge of saliva from the mouth, accompanied by swollen and inflamed gums, a very offensive odour from the breath, pasty tongue, loss of appetite, &c. In our patient, the horse, it is seldom the result of intentional drugging. It has been known to occur, however, as the result of a horse licking itself or other animals when mercurial ointment has been lavishly employed for skin troubles. It may also result where animals have picked up mercurial pigments, and in the neighbourhood of quicksilver furnaces it sometimes appears from the consumption of herbage contaminated with fine particles of cinnabar—the mineral from which it is chiefly obtained. In advanced cases of mercurial poisoning, lassitude, wasting, and the passage of blood-stained fæces are among the more prominent symptoms. There is no specific antidote to mercury as a poison, but animals frequently recover from its effects when removed to a suitable environment, receiving plenty of fresh air and a liberal diet supplemented by milk, eggs, and linseed.

Iodine.—In this product of sea-weed we have a most valuable remedy for the treatment of a variety of equine troubles. For veterinary purposes the chief preparations employed are the tincture, the liniment, and the ointment, iodide of iron, biniodide of mercury, iodide of arsenic, and iodoform.

Action and Uses.—Externally, iodine is used as a skin irritant, the tincture being painted on to small areas of skin in the treatment of ringworm and other localized parasitic affections, as well as for the reduction of glandular and other swellings. It is also applied to unhealthy wounds and indolent ulcers. In the form of iodoform it is injected up the nostrils in certain varieties of nasal gleet, and largely

used to wounds as an antiseptic dressing. For blistering purposes the biniodide of mercury is commonly employed in veterinary practice. (See Mercury, page 488.)

Internally, iodine is usually prescribed in combination with potassium, iron, or arsenic; the former to excite absorption of effused fluids or glandular enlargements, and the latter as tonics and alteratives. (See Iron and Arsenic, pp. 447 and 453.) Cystic swellings and hydrocele, after the fluid contents have been evacuated, are sometimes injected with tincture of iodine to prevent further accumulations.

Iodine preparations given internally pass quickly into the circulation, and to all the organs. They are rapidly eliminated by the kidneys and the skin, and are to be found in the saliva, urine, nasal mucus, sweat, and in the milk. Iodides too long continued irritate the salivary glands and skin, and all the organs concerned in separating it from the body. This condition is known as Iodism. Taken together the symptoms resemble salivation by mercury, there being a spongy condition of the gums, with increased flow of saliva, defluxion of tears, loss of appetite, and prostration, with wasting of the testicles and other glands. Iodides have the effect of removing the rheumatic poison from subjects of that disease (see Rheumatism, page 21 of this volume), and are given in cases of lead and mercurial poisoning on account of their chemical affinity for those metals and the comparatively harmless compounds resulting.

Phosphorus.—Phosphorus is "a non-metallic element obtained from bones", and by itself is seldom administered to equine patients. It effects changes in certain tissues, especially bone, and in small and long-continued doses increases their density. It is a very active poison in any but fractional doses, and speedily induces fatty heart, liver, and other organs. It is given in obscure cases of paralysis and debility in combination with mineral tonics. Phosphoric acid is prescribed with vegetable bitters, and the salts are prescribed for colts with soft bones (rickets). Phosphates of lime, iron, soda, and magnesia are given as a syrup to assist bone formation in young animals.

Sulphur.—Sulphur is a drug of much general utility in veterinary practice, and is one of the few "specifics" referred to in our opening remarks.

The chief preparations used are sublimated sulphur, commonly called flowers of sulphur, precipitated sulphur, sulphur ointment, sulphurated potash, and numerous combinations with other metals as sulphides, sulphites, hyposulphites, and sulphates.

Actions and Uses.—Sulphur, either as an ointment or as a lotion with oil as the vehicle, has been used for skin diseases from time imme-

morial, being known to the ancients as a specific for itch in man and mange in animals. The mange mite cannot live in its presence, or in that of sulphuretted hydrogen or sulphurous acid, both of which are developed when sulphur is brought into contact with the skin.

Sulphurous acid, as has already been explained (see page 485), is the product of sulphur burned in the air, and is a valuable disinfectant and parasiticide. Horses are sometimes made to inhale it in diseases of the throat and nostrils, and with apparent benefit.

Sulphur is given as a mild aperient or gentle laxative, and often combined with epsom salts. In small doses it is alterative and diaphoretic, and when given for some time it assists to impart the glossy appearance of the skin, for which alterative powders containing it are so much valued.

Sulphuretted hydrogen passed into water, and used quickly, has the same destructive influence upon lice as the flowers of sulphur, but convenience dictates the use of a solution of sulphuretted potash, a preparation which holds the gas in loose chemical union, but which gives it up freely to water. It is an unstable compound, however, and for this reason is not so often employed as it might be.

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Miss BERTHA BANNER, Training Teacher of Sewing and Dressmaking at the Liverpool Technical College for Women.

Mr. A. BLACK, C.E., Architect, Author of *First Principles of Building*.

Mrs. DAVIDSON, Author of *Dainties*, *What our Daughters can do for themselves*, &c.

Miss J. FORSTER, Principal of the Cheshire County Council Dairy Institute.

Mrs. H. R. HAWEIS (the late), Author of *The Art of Decoration*, *The Art of Beauty*, &c.

Miss HELENA HEAD, Principal of the Liverpool Girls' School for Secondary Education in Domestic Science, and Author of the *Manual of Housewifery*.

Mrs. A. HODGSON, Home Decorator to *The Lady*.

Mr. R. KEITH JOHNSTON, Author of *Household Difficulties and How to overcome Them*.

Miss GERTRUDE J. KING, Secretary to the Society for Promoting the Employment of Women.

Miss E. E. MANN, Head Teacher at the Liverpool Training School of Cookery.

Colonel M. MOORE-LANE, Contributor to the *Field* and other agricultural papers.

Mrs. C. S. PEEL, Dress and Household Editor of *Hearth and Home*, and Author of *The New Home*.

Miss. B. SIBTHORPE POOLEY, Lecturer to the Liverpool Ladies' Sanitary Association.

Miss RANKIN, Head Teacher of Laundry Work at the Liverpool Technical College for Women.

Miss FLORENCE STACPOOLE, Lecturer to the National Health Society and the Councils of Technical Education, and Author of *Handbook of Housekeeping for Small Incomes*, &c.

Mr. DAVID TOLLEMACHE, late editor of *The Chef and Connoisseur*.

The contents of THE BOOK OF THE HOME may be grouped under four heads. The first deals with all matters concerning the House—from the choice of its site to the least of its internal decorations. The householder is instructed in the laws regarding landlord and tenant, and counselled in the important matters of sanitation and ventilation, heating and lighting, and the stocking and management of the garden. The housekeeper is advised as to furnishing, everything necessary for the comfort and adornment of a well-equipped house being described in detail, hints being also given regarding removals, painting and papering, artistic decoration, arrangement of linen and store cupboards, &c.

In the second the daily routine of the Household is considered—the duties of the servants, their wages, their leisure and pleasures, the management of the kitchen, laundry, and store-room. Plain and fancy cooking receive due attention, recipes being given of a large variety of dishes, and suggestions made for breakfast, lunch, afternoon-tea, dinner, and supper. A number of menus are added suitable for the different seasons. Invalid cookery also has its special section.

In the third are discussed the legal and customary duties, and the occupations and pastimes, of Master and Mistress, the former being instructed as regards insurance and the making of a will, and the smaller matters of carving, the care of the wine-cellar, and the inspection of garden and stables, while the latter is advised as to account-keeping, payments, shopping, and innumerable other matters connected with her duties as Mistress. Other subjects treated under this head are dress, home occupations, visiting and entertaining, and indoor and outdoor amusements.

In the fourth sound, systematic, and practical advice is given as to the management, in health and sickness, and the education, of children, and also on such important subjects as occupations for boys and girls, the ceremonies necessary on the coming out of a daughter, and the preparations and formalities necessary before and after a marriage.

THE BOOK OF THE HOME will thus be at once an indispensable ally to the young bride and the novice in housekeeping, and a valuable work of reference to the more experienced.

Prospectus of any Book post free.

The Natural History of Animals:

The Animal Life of the World in its various Aspects and Relations. By J. R. AINSWORTH DAVIS, M.A., of Trinity College, Cambridge, and of University College, Aberystwyth. Profusely illustrated with full-page colour and black-and-white plates, and engravings in the text, by eminent animal artists. In 8 half-volumes, cl. extra; also in 4 volumes, Roxburgh binding.

While the sum of human knowledge is gigantic now as compared with what it was a hundred years ago, in the department of Natural History the books upon which the great majority of us must depend have undergone practically no change. The general Natural History still follows the lines adopted by Goldsmith in his famous and delightful *Earth and Animated Nature*. That is to say, they are little more than classified catalogues of animals, taking up in succession the various groups and individuals, and describing them one after another, each as standing by itself. This is not what the intelligent reader of the present day requires. He must be put in a position to take a comprehensive grasp of the subject; he demands a competent guide, not a directory, however accurate.

It is with this end in view that THE NATURAL HISTORY OF ANIMALS has been compiled. It treats this great subject on essentially modern lines, giving an accurate and vivid account of the habits, relationships, mutual interdependence, adaptation to environment, &c., of the living animals of the world.

It is needless to say that the production of such a work demanded a man who has devoted his life to the study of biology and zoology, and who at the same time is a gifted writer and expounder. This rare combination has been found in the person of Prof. J. R. AINSWORTH DAVIS, M.A., of Trinity College, Cambridge, and of University College, Aberystwyth, the author of the present work. Prof. DAVIS is well known to naturalists as an ardent worker in Natural History, particularly in the field of marine zoology. He is a very distinguished graduate of Trinity College, Cambridge, the chief scientific school in Britain, perhaps in the world, and has done a great deal of literary work, both scientific and in other directions.

Briefly, **the object of Prof. Davis's work** is to give in a readable form and in non-technical language a general survey of the whole animal world from the stand-point of modern science—and the work may fairly claim to be a **Natural History on a new plan**, the first comprehensive work in English of its own special kind. Formerly Natural History had much the character of a miscellaneous aggregate of disconnected facts, but hardly any fact or feature connected with any animal can now be considered as isolated from others; and animals as a whole must be looked upon as interrelated in the most surprising manner both with one another and with their surroundings.

Every household library should contain a Bible, a Dictionary, an Encyclopedia, and a work on Natural History. This is the "irreducible minimum"; other books we may have, these we must. For THE NATURAL HISTORY OF ANIMALS it may fairly be claimed that it has a better title than any other work to become the **Natural History for the Household**. It is a work in which the adult reader will find a never-failing mine of information, while the younger members of the family will delight in its wealth of illustration, and its store of interesting and suggestive anecdote.

To teachers THE NATURAL HISTORY OF ANIMALS may be regarded as indispensable. More than usual attention has of late been directed to the important subject of **Nature-study**; and in this respect the appearance of Prof. Davis's work could scarcely have been more fitly timed. In the domain of Natural History it is pre-eminently the book for the purpose. Its clear and orderly arrangement of facts, its masterly grasp of general principles, its comprehensiveness of scope and simplicity of style, combined with the most absolute scientific accuracy, render this work an invaluable book of reference for those who aspire to teach Nature-study on up-to-date principles.

The Illustrations, as befits a work of such importance, are on the most lavish scale. A large number are in colour, reproductions, by the latest processes of colour engraving, of exquisite pictures by the most eminent animal draughtsmen. In illustrating the work talent has been sought wherever it was to be found; and the list of artists is representative of several nationalities. A large number of the designs are the work of Mr. A. FAIRFAX MUCKLEY, who is probably unsurpassed in the capacity to depict living creatures with absolute fidelity to detail without sacrificing the general artistic effect. FRIEDRICH SPECHT, one of the most eminent German animal painters of the past century, is represented in THE NATURAL HISTORY OF ANIMALS by many of his best designs in colour and black-and-white. W. KUHNERT, another German artist whose work is universally admired; and M. A. KOEKKOEK, the talented Dutch painter, are also among those who have assisted in the embellishment of the work. An important feature is the series of diagrammatic designs showing the structure of certain typical animals, specially drawn under the direction of Prof. Davis.

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The Modern Carpenter, Joiner, and Cabinet-Maker:

A Complete Guide to Current Practice. Prepared under the editorship of G. LISTER SUTCLIFFE, Architect, Associate of the Royal Institute of British Architects, Member of the Sanitary Institute, editor and joint-author of "Modern House-Construction", author of "Concrete: Its Nature and Uses", &c. With contributions from many specialists. Illustrated by a series of about 100 separately-printed plates and 1000 figures in the text. In 8 divisional volumes, super-royal quarto, handsomely bound in cloth, with cover design by Mr. TALWIN MORRIS; also in 2 volumes, Roxburgh binding. In complete sets only.

In preparing THE MODERN CARPENTER the editor has had the great advantage of working upon the basis of Newlands's *Carpenter and Joiner's Assistant*, which for nearly half a century has been accepted as a **standard authority** on the subjects of which it treats, and for many years has been recommended by the Royal Institute of British Architects as **a text-book** for the examination of that society. And yet in the present work it has been possible to preserve only a very small part of Newlands's treatise, invaluable though this has been to two generations of craftsmen. While the fundamental features of arrangement and method which distinguish this famous work have been retained, the matter has had to be **entirely rewritten,** and many new sections have been added, on subjects not touched upon in the older work, with which the carpenter of the present day requires to be familiar.

In the new book, indeed, the old foundations that have stood the test of half a century of practical use have been retained, but **the superstructure is wholly new.**

The lesson to be learned from this fact is not far to seek. It is that the modern carpenter requires a **far wider expert knowledge** than sufficed his predecessor. The development of wood-working machinery, the introduction of new kinds of timber, improvements in the design of structures, the more thorough testing of timbers, and progress in the various industries with which Carpentry, Joinery, and Cabinet-making are intimately allied, have all helped to render the craft more complex. The carpenter of the present day has no use for the old "rule of thumb" methods; his calling is both an art and a science, and **knowledge, knowledge, and again knowledge** is the primary condition of success.

The editor of THE MODERN CARPENTER, **Mr. G. Lister Sutcliffe,** Associate of the Royal Institute of Architects, **needs no introduction** to practical men; his name is already well known not only through his professional position in the architectural world, but through his editorship of *Modern House-Construction*, a work which, although issued only a few years ago, has already become a standard book of reference. Mr. SUTCLIFFE'S large experience has enabled him to enlist the services of a **highly-qualified staff of experts,** whose special knowledge, acquired through long years of practical work, is now placed at the disposal of every member of the craft. The first condition in selecting the contributors to the work was that they should be **practical men,** not only possessing the indispensable knowledge, but having the ability to impart it. The result is that within the eight divisional-volumes of this work we have a treatise on every branch of the craft, distinguished by four outstanding qualities:—It is (1) **complete,** (2) **clear,** (3) **practical,** and (4) **up-to-date.**

An idea of the scope of THE MODERN CARPENTER may be gathered from the fact that while its predecessor, *The Carpenter and Joiner's Assistant*, comprised only **eight** sections, the new work includes no fewer than **sixteen.** A glance at these will show that the work **covers the whole field;** it is a complete encyclopædia upon every subject that bears upon the everyday work of the practical man.

I. Styles of Architecture.
II. Woods: Their Characteristics and Uses.
III. Wood-working Tools and Machinery.
IV. Drawing and Drawing Instruments.
V. Practical Geometry.
VI. Strength of Timber and Timber Framing.
VII. Carpentry.
VIII. Joinery and Ironmongery.
IX. Staircases and Handrailing.
X. Air-tight Case-Making.
XI. Cabinet-Making.
XII. Wood-Carving.
XIII. Shop Management.
XIV. Estimating.
XV. Building Law.
XVI. Index, Glossary, &c.

The Illustrations are not the least of the many notable features of this great undertaking. The work is embellished in the first place with about **100 full-page plates,** reproduced, some in colours, by the most approved processes of mechanical engraving, and printed on specially-prepared paper. In addition to this unique collection there are no fewer than **1000 diagrams and designs** in the body of the work. No trouble or expense has indeed been spared to procure illustrations where these could elucidate the text.

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EXPLANATIONS FOR THE MODEL "THE HOOF OF THE HORSE"

Ia. Side view of the hoof and the lower part of the limb (left fore-foot):

1. Lower part of shin-bone.
2. Fetlock-joint.
3. Long pastern.
4. Coronet-joint.
5, 5. Coronet.
6. Heel.
7. Hoof.
8. Quarter.
9. Heel of crust.
10. Toe.

Ib. Lower surface of the hoof:

11–14. Ground surface of crust.
15, 15. Inflection of the crust or wall.
16, 16. Lacunæ of frog.
17, 17. White line at junction of sole and crust or wall.
18, 18. Bars.
19. Sole.
20, 20. Outer and inner angles of the sole.
21. Frog.
22. Frog point or apex.
23, 23. Outer and inner bulbs of frog.
24. Cleft of frog.
25, 25. Heels.

IIa. Section of the hoof, seen from the inner side:

1. Wall, cut through at the toe-line.
2. Laminæ of the wall.
3. Same, in section.
4, 4. Coronary border of hoof.
5. Coronary groove.
6. Plantar border of wall or crust.
7. Horny sole, in section.
8. Part of the lower surface of the sole.
9. Inner surface of the frog.
10. Same, in section.

IIb. Horny case, seen from above:

11, 11. Outer wall.
12, 12. Coronary border.
13, 13. Coronary groove.
14, 14. Inner aspect of horny sole.
15, 15. Laminæ of the bars.
16. Frog.
17. Heels.

IIIa. Exterior side view of the hoof-skin:

1, 1. Hoof.
2. Fleshy or sensitive laminæ.
3. Coronary cushion.
4, 4. Skin with the hair removed.

IIIb. The hoof-skin seen from below:

5, 5. Fleshy or sensitive sole.
6–7. Sensitive laminæ of the bars.
8, 8. Fleshy or sensitive frog.
9. Cleft of the frog.
10–11. Inner and outer heels of the fleshy frog.

IVa. Blood-vessels and nerves of the hoof and of the lowest part of the limb (right fore-foot, side view):

1, 1. Digital artery going to the foot.
2. Perpendicular artery.
3. Coronary artery.
4. Preplantar artery.
5, 5, 5. Inferior branches of the preplantar artery.
6, 6, 6. Artery of the toe.
7, 7. Toe vein.
8, 8. Net-work of veins in and beneath the sensitive laminæ.
9, 9, 9. Net-work of veins in the deep coronet.
10, 10. Plantar nerve.
11. Anterior digital nerve.
12, 12. Posterior digital nerve.
13, 13. Branches to the skin.
14. Extensor tendon of the foot bone and pastern.
15. Outer branch of suspensory ligament.

IVb. Blood-vessels of the hoof, seen from below:

16, 16. Arteries of the frog.
17, 17. Arteries of the sole.
18, 18. Net-work of veins in the heels.
19, 19. Net-work of veins in the sensitive sole.
20, 20, 20. Circumflex or toe vein.

Va. Side view of the bones of the hoof and of the lower part of the limb:

1. Lower end of the shin or canon bone.
2. Sesamoid bone.
3. Upper pastern bone or first phalanx.
4. Lower pastern bone or second phalanx.
5. Pedal bone or third phalanx.
6. Fetlock-joint.
7. Pastern-joint.
8. Pedal or foot joint.
9. Condyle of canon bone.
10. Upper articular margin of long pastern bone.
11. Lower articular margin of same.
12. Upper articular margin of lower pastern bone.
13. Lower articular margin of same.
14. Articulating surface of pedal bone.
15. Outer surface of pedal bone.
16. Coronal or pyramidal process of the pedal bone.
17. Basilar process of the pedal bone.
18. Plantar fissure of pedal bone.
19, 19, 19. Foraminæ or openings for the passage of blood-vessels.
20, 20. Lower border of the pedal bone.

Vb. Pedal bone, seen from below:

21. Under surface of pedal bone.
22, 22. Alæ or wings of pedal bone.
23, 23, 23. Margin for attachment of flexor pedis tendon.
24. Eminence for attachment of inferior navicular ligament.
25, 25. Foraminæ or openings for entry of plantar vessels.
26, 26. Margin of the sole.

VIa. Central longitudinal section of the lower part of the limb:

1, 1, 1, 1. Skin.
2. Ergot.
3. Horny wall.
4. Horny sole.
5. Horny frog.
6. Extensor pedis tendon.
7, 7. Flexor pedis perforans.
8, 8. Superior and inferior navicular ligaments.
9, 9. Flexor pedis perforatus.
10. Sesamoid bone.
11. Lower end of canon bone.
12. Upper pastern bone.
13. Lower or small pastern bone.
14. Pedal bone.
15. Navicular bone.
16. Fetlock-joint.
17. Pastern-joint.
18. Pedal or foot joint.
19. Capsular ligament of pedal joint.
20. Sensitive laminæ.
21, 21. Sensitive sole.
22. Sensitive frog.
23. Plantar cushion or frog pad.

VIb. Under surface of the pedal bone:

24. Under surface of pedal bone.
25–27. Expansion and attachment of the flexor pedis tendon to pedal or foot bone.
28, 28. Lateral cartilages.

VIIa. Side view of the foot, with the hoof shod:

1. Front of the hoof.
2. Outer quarter.
3. Outer heel.
4. Toe of the shoe.
5. Clip of the shoe.
6. Outer quarter of shoe.
7. Outer heel.
8. Foot surface of shoe.
9. Ground surface of shoe.
10. Clinch of the outer first toe-nail.
11. Clinch of the outer second toe-nail.
12. Clinch of the outer first chief nail.

VIIb. A shod hoof, seen from below:

13. Toe of shoe.
14–15. Inner and outer quarters of shoe.
16–17. Inner and outer heels of shoe.
18, 18. Fullering.
19, 19. First toe-nail heads.
20, 20. Second toe-nail heads.
21, 21. First chief nail heads.
22. A sharp or pointed calk screwed into the calk-hole.
23. Calk-hole with the last turn of the screw.

Cross section of a shoe, nails, calks:

24. Cross section of a shoe.
25. Bearing surface.
26. Sloping surface.
27. Fullering.
28, 28. Ground surface.
29. Nail-hole.
30. English shoe-nail, broad surface.
31. The point.
32. The body or shaft.
33. The head.
34. English shoe-nail seen edgewise.
35. American shoe-nail, broad surface.
36. American shoe-nail seen edgewise.
37. Sharp or pointed screw-calk, side view.
38. The thread.
39. The head.
40. Blunt screw-calk, side view.
41. The thread.
42. The head.
43. Blunt screw-calk, seen from above and from the side.
44. The head.
45. The thread.
46. The groove.
47. Angular calk.
48. H-calk.
49. Wedge-shaped calk.

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